Plant Archives Vol. 19 No. 2, 2019 pp. 3097-3105 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

PROPOSALS FOR IMPROVING THE AGRICULTURAL INNOVATION SYSTEM (AIS) PERFORMANCE IN THE FIELD OF DEVELOPING BARLEY CULTIVATION IN IRAQ FROM AGRICULTURAL RESEARCHERS POINT OF VIEW

Israa Jabbar Mhaibes* and Hussain Khadair Al-Taiy

Department of Extension and Transfer of Engineering Technologies, College of Agricultural Engineering Sciences, University of Baghdad, Iraq.

Abstract

The aim of the research is to identify proposals for improving the agricultural innovation system's performance in the field of developing barley cultivation in Iraq from the agricultural researcher's point of view. To achieve the research objective, an 80-paragraph plan was prepared covering 11 areas of the innovation system (the general framework of the system, innovation net, human and material capacities, programs, technical field, policy and support, farmer, services, monitoring and evaluation, and financial allocations). The research data were collected during the months of August and September from 34 agricultural researchers with higher degrees distributed to the basic departments in the agricultural innovation system (Agricultural Research Department of the Ministry of Agriculture, Agricultural Research Department of the Ministry of Science and Technology, Seed Inspection and Certification Department, Department of plant protection, Between Mesopotamia General Seed Company, the Iraqi Seed Production Company, and the Directorate of Agriculture in Baghdad in Karkh and Rusafa). The research concluded that the importance means of the proposals ranged between (3-3.79) with a mean average of 3.36, on a five-importance scale (very important, important, somewhat important, less important, unimportant) its numeric values ranged between 0-4 degrees. Research shows that 23% of the proposals ranged between the average of (3.50 - 3.79) with a total average of 3.63, which is within a very important level. Foremost the preservation of the genetic traits of the seeds and the prevention of their degradation by mixing with weed seeds, support prices for the sale of barley seeds to the farmer, develop the capacities of the seed purification plants belonging to the seed production companies by increasing their numbers and coverage for the purification of barley seeds. And that 77% of the proposals ranged between the averages of the importance of (3-3.50) with an average of 3.28 and falls within the level of importance. Foremost the development of teamwork and achieve the work of the Integrated Multidisciplinary Team, providing training for researchers within the country and research programs abroad, and providing postgraduate programs MA and Ph.D. in barley crop for agricultural researchers. The researchers recommend that the Ministry of Agriculture, especially policymakers and decision-makers in the organizations that make up the network of the innovation system, should pay attention to the results of the research and make better use of them to improve the performance of this system and then develop the cultivation of barley.

Key words: Agricultural Innovation System (AIS), Barley Cultivation, Agricultural Research Department

Introduction

Iraq faces major challenges in its agricultural field, foremost of which is achieving sustainable food security based on national production and meeting the growing needs of agro-plant and animal products and food that resulting from large and continuous population increases. Estimates indicate that the population of Iraq will reach 51 million in 2025 (AL-Hakim, 2013). And this number will double in 2050 which requires a sustainable increase in agricultural production over the years and decades up to 50% in some crops and 100% in crops and other products (Al-Taiy, 2018). These challenges represent the central objective of the Ministry of Agriculture and the main objective of its strategic plan for the years 2015-2025 (Ministry of Agriculture, 2015), as well as a central objective in the national development plans for the years 2010-2014 and 2013-2017 (Ministry of Planning, 2009; Ministry of Planning, 2013). These challenges are in the

****Author for correspondence :*** E-mail : Israa.Jabbar1109@coagri.uobaghdad.edu.iq

context of the challenges faced by agriculture in the world, which has been summarized by FAO in achieving food security and conservation of natural resources while minimizing the impacts of climate change (FAO, 2015).

The global approaches and strategies for achieving food security and sustainable development are numerous, with the achievement of sustainable increases in productivity in the plant and animal fields, which is also one of the major challenges facing the world in agriculture (FAO, 2018). In addition, the Food and Agriculture Organization of the United Nations (FAO) has considered achieving a sustainable increase in agricultural productivity as one of the basic principles of sustainable agricultural development (FAO, 2014). Agricultural innovation is a means to achieve sustainable growth in agricultural production, both animal and plant, improving its quality, conserving natural resources and improving the incomes of small farmers (FAO, 2015; World Bank, 2012; OECD, 2016).

The barley crop is one of the most important crops in the world, because of its multiple uses. It is used in human food, animal feed, and enters many industries. The main use is as animal feed. Barley beans are used mainly as a source of energy and protein in ruminant feed (Bauer *et al.,* 2017). Barley is experiencing increasing interest in the expansion of cultivated areas and increasing its productivity globally and locally, particularly in the use of feed. Fodder is a key element in the agricultural development of the provision of meat and animal products in a sustainable manner. Also, fodder is now an important component of the world economy. Countries produce, export, and import fodder millions of dollars yearly (FAO, 2017). For example, Saudi Arabia imports 52% of the green feed from outside the Kingdom from Argentina, Romania, Spain and the United States (Arabic, 2017). Also, Abu Dhabi imports 1.7 million tons of feed per year (Gulf Center for Studies, 2016). And Qatar imports fodder of all kinds and there are other countries exporting feedstock such as Russia, Germany, and Canada (FAO Statistics, 2013).

In Iraq, barley is the second of the highest yielding crops and is the first of the fodder crops. It is cultivated in large areas, exceeding 4 million dunums (million hectares). It is an agricultural activity practiced by most farmers. It is usually cultivated with the wheat crop (Ministry of Agriculture, 2015). And it's used in concentration fodder for Ruminants (cattle, sheep, and buffaloes) and poultry. The researchers stressed the importance of this crop, saying "there is no barley there are no ruminants". Among the directions of the Ministry of Agriculture are the expansion of cultivated areas and the increase in productivity and sustainability, which is still weak compared to what it can be in the country and compared to what has been achieved in many Arab and European countries. The estimated productivity for the years of 2011-2014 by 1.16 tons in Iraq / While production in Saudi Arabia was 7.46 tons/ha and in Kuwait, 6.21 tons /ha in 2013.

The development of barley cultivation and the sustainability of its increased productivity and production is a large and complex process that primarily depends on the agricultural innovation system as an integrated and interactive network of organizations, individuals and policies responsible for the series of innovation processes (Jose, 2014; OECD, 2013), starting from the diagnosis of problems in the fields of farmers and the development of solutions to those problems and develop them to publish them to all farmers (Rogers, 2003; OECD, 2013). Therefore, this system has witnessed attention at the global level, especially in the third millennium by international organizations and ministries of agriculture in the field of development, particularly in developing countries to meet the challenges. For example, the FAO Project strengthening the Agricultural Innovation Systems for Agricultural Development in Central Asia (FAO 2014). Also, the Agricultural Innovation Systems Capacity Development Program (TAP). And the EU Innovation Partnerships to Increase Productivity and Environmental Sustainability 2014-2020 (EU, 2013).

Therefore, the development of the innovation system in Iraq is a national necessity for the importance of its roles in facing the challenges of agriculture in general, including the development of barley cultivation. In fact, the reality of agriculture in Iraq in the fields of plant and animal is still below the level it should be for achieving sustainable food security. The National Development Plan 2018-2022 clearly indicated that the objectives of the National Development Plan 2013-2017 did not achieve in the agricultural sector and this sector still faces great challenges (Ministry of Planning, 2018). So this is an indicator of the weakness of the performance of the agricultural innovation system in Iraq in facing challenges and this is consistent with what came in the study of Fattalawi and Al-Taiy (Fatalawi, 2018) which indicated that the performance of the agricultural innovation system is still substandard in the development of crops productivity. Actually, the current situation indicates that the productivity of the barley crop is still below the level at which it should be and the level of attention it should receive as a strategic crop. Therefore, the current research aimed at presenting proposals to improve the performance of the agricultural innovation system in the

development of barley cultivation in Iraq from the agricultural researcher's point of view.

Agricultural Innovation System (AIS)

A network of departments, institutions and individuals that includes agricultural scientific research centers, seed production centers (Seed Technology Center, Mesopotamia and Iraqi Seed Production Company), Seed Inspection and Certification Department, Agricultural Extension Service and Plant Protection, as well as policies (Enabling environment) for these institutions and barley farmers. This system works on developing highly productive varieties and technologies, marketing them and providing them to the farmers, in order to achieve a wide spread of technologies and achieving high productivity with the sustainability of natural resources.

Methods and Materials

Methodology

The descriptive approach was used to conduct the current research, and a sample was selected from 34 agricultural researchers working in the organizations that comprise the agricultural innovation system network: (Department of Agricultural Research / Ministry of Agriculture, Department of Agricultural Research / Ministry of Science and Technology, Seed Inspection and Certification Department / Ministry of Agriculture, Department of plant protection/ Ministry of Agriculture, College of Agricultural Engineering Sciences/University of Baghdad, Mesopotamian General Seed Company / Ministry of Agriculture, Iraqi Seed Production Company / Ministry of Commerce, Directorate of Agriculture Baghdad in Karkh and Rusafa.

Preparing the research plan

Based on the literature and scientific research, a plan was prepared for areas and proposals to improve the performance of the system, consisting of 80 paragraphs distributed in 11 fields. After the presentation of the plan to 12 specialists in the field of agricultural extension and field crops, the research plan was prepared in its final form.

Data Collection

The questionnaire was used as a tool to collect data from the research sample to identify proposals for improving the performance of the agricultural innovation system.A five importance scale used to measure the importance level, whose numerical values ranged between 4-0 degrees distributed according to levels (very important, important, somewhat important, less important, and unimportant). The data were collected from the respondents through field visits to the system's departments and interviews during the months of August and September 2018. The questionnaire was filled by 34 researchers working in the agricultural innovation system.

Results and Discussion

Objective

To identify proposals to improve the performance of the agricultural innovation system in the field of developing barley cultivation in Iraq.

First: Proposals to improve the performance of the agricultural innovation system in the field of developing the cultivation of barley in Iraq.

The results of the research show that there are 80 proposals for improving the performance of AIS for developing barley cultivation from agricultural researchers' point of view. The average of the importance ranged from (3.79-3) with an average of 3.36 on a five-point scale (very important, important, somewhat important, less important, unimportant) whose numeric values varied between 0-4 degrees. 23% of the proposals ranged from 3.50 to 3.79, with an average of 3.63, which falls within a very important level. Namely, the preservation of the genetic traits of the seeds and preventing their degradation by mixing. Also, supporting the prices of selling barley seeds to the farmer. Future more, capacity development of the seed purification plants of the seed production companies by increasing their numbers and their coverage for the purification of barley seeds. And, developing a general framework for the agricultural innovation system at the country level. 77% of the proposals ranged from 3 to 3.50 with an average of 3.28. They are within an important level in a very important direction. These include, the development of teamwork and the work of the integrated multidisciplinary team. Also, providing training for researchers from within-country training and research programs abroad. And increasing areas for seed companies and research centers for barley research as shown in table 1.

Table 1: The distribution of the paragraphs according to their levels of importance.

Numerical limits of importance means	Paragraphs number	%	Importance level	Average
3.5-3.79	18	23	Very important	3.63
3-3.5	62	77	Important	3.28

Table 1 illustrates: 1. the proposals for improving the innovation system performance fall within a very important and important level from the perspective of agricultural researchers. 2. There is a need to improve the performance of the agricultural innovation system,

the improvement should be a comprehensive process for all components of the system.

Second: Distributed the proposals according to the fields of agricultural innovation system.

The general framework

The results show that there are two proposals in the framework of innovation system. First, develop a general framework for the agricultural innovation system at the country level with an average importance of 3.70**.** Second, a broad partnership between the agricultural departments and organizations in the innovation system with an average of 3.58, as shown in table 2.

Table 2 illustrates that there is a necessity to develop a general framework for agricultural innovation system. This framework will be a guide for decision and policy makers to improve the agricultural innovation system performance in order to develop barely cultivation in Iraq.

Innovation net

The results show that there are 8 proposals in innovation net area from the agricultural researcher's perspective. Their importance mean averages ranged between (3.21 - 3.45) with an average of 3.32. All the proposals fall within an important level. These include the development of teamwork aimed at achieving the integrated multidisciplinary team, achieving the partnership of all the relevant departments and organizations of the system, achieving interaction among all actors in the development of barley cultivation, and developing mechanisms (interaction, coordination, and action work) between all parties, as shown in table 3.

Table 3 shows that there is a need to develop partnerships between scientific research centers, agricultural colleges and international centers, and to achieve interaction, coordination and action work among all departments of the system to reach the spread of technologies for the barley harvest and reactivate the work of the system.

Capacity development

The results show that there 23 proposals in capacity development area from agricultural researcher's point of view. Their importance averages ranged between (3.03 - 3.76) with an average of 3.33. Around 22% of the proposals have ranged between (3.52-3.76) and fall within a very important level, which comes in the forefront of developing the capacities seed purification plants that belonging to the seed production companies through increasing the number and coverage of the purification of barley seeds, developing the effectiveness of field inspection, and developing a rapid processing capabilities or mechanisms for providing farmers with high-yielding seeds as well as other inputs (pesticides, fertilizers, agricultural mechanization). And that 78% of the proposals ranged between the averages of importance between (3.03-3.45) and falls within the level of important, the foremost of which is to provide the necessary training for researchers from within the country training and research programs abroad**,** providing postgraduate programs for the researchers and workers in the agricultural research departments, and increase the areas allocated for product barley seeds by seed companies or farmers producers of barley seeds (Table 4).

Table 2: The proposals in framework area.

No.	Proposals	Importance mean
1	Develop a general framework for the agricultural innovation system	3.70
2	A broad partnership between the agricultural departments and organizations in the innovation system	3.58

Table 3: The proposals in the Innovation net area.

No.	Proposals	Importance means
1	Developing a teamwork aimed at achieving the integrated multidisciplinary team.	3.45
2	Achieving the partnership of all the relevant departments and organizations of the system	3.36
3	Achieving the interaction among all actors in the AIS to develop barley cultivation	3.36
4	Developing mechanisms (interaction, coordination, and action work) between all parties	3.33
5	Naming the departments, companies and individuals that make up the agricultural innovation system in the field of barley cultivation development.	3.3
6	Developing coordination in order to make better use of available resources.	3.3
7	Formatting unit or commissioning of the Agricultural Research Department or other to be responsible for achieving the processes of interaction and coordination and teamwork	3.24
8	The need to achieve the participation of the private sector as an active partner in the system network.	3.21

Table 4: The proposals in the capacity development area.

No.	Proposals	Importance means
1	Developing capacities and capabilities of seed purification factories.	3.76
2	Developing the effectiveness of field inspection	3.61
3	Developing mechanisms for providing farmers with seeds and other inputs	3.61
4	Sustainable increasing in barley seed production in order to cover all farmers needs	3.58
5	Meeting the needs of research departments from technical capacities.	3.52
6	Provide training for researchers from in-country training and research programs abroad.	3.45
7	Providing graduate programs in the field of barley for researchers and workers in scientific research centers	3.45
8	Increase the areas allocated for the production of barley seeds.	3.42
9	Developing the marketing services for barley seeds by increasing the capacity of warehouses and providing suitable storage conditions.	3.42
10	Increasing the areas allocated to scientific experiments.	3.36
11	Sustainability of developing the capacity of researchers through organize seminars, workshops and scientific conferences and interaction with specialized research centers and colleges of agriculture.	3.33
12	Providing the necessary capacity to conduct more confirmation experiments in farmer's fields.	3.33
13	Increasing the number of researchers and the diversity of their specialties in the field of barley.	3.3
14	Increasing areas for producing high grade seeds of barley varieties.	3.27
15	Developing crop protection services for barley crops through rapid and effective response to potential pests in the fields.	3.24
16	Increasing the number of applied experiments in the fields of farmers.	3.21
17	Developing the capacities of the agricultural extension workers in preparing and implementing of specialized extension programs.	3.21
18	Using modern means of communication (Internet and mobile networks) as well as other methods of extension in order to achieve wide communication with farmers.	3.15
19	Encouraging the private sector to produce seeds and activate monitoring and field inspection.	3.15
20	Developing communication capacities among the extension department, farmers and other parties in the agricultural innovation system.	3.09
21	Developing capacities of women's extension capacities by increasing their number and providing a training programs to them.	3.09
22	Encouraging competition among private seed production companies among them, and competition among governmental companies.	3.06
23	Developing extension capacity in general and barely programs in particular.	3.03

Table 4 shows that there is an urgent need to develop the material and human capacities of the agricultural innovation system in order to be more effective in implementing its roles.

Programs area

The results show that there are 6 proposals in programs area, their mean ranged between (3.09-3.58) with an average of 3.35. 17% of the proposals fall within a very important level and include the preparation and implementation of a national development program for the development of barley cultivation in the country, similar to other national programs with an average value of 3.58. And that 83% is within an important level towards very important, comes in the forefront continue with the current program of high- grade seeds of barley varieties with average importance of 3.45 (Table 5).

Table 5 illustrates: 1 - The need for a development program for barley along the lines of programs for other crops. 2 - The need for special programs for all components of the system of agricultural innovation serve as guidance for the work of the system.

Technical area

The results show that there are 7 proposals in the technical area from agricultural researchers point of view, their means ranged between (3.21-3.79) with an average of 3.49. 57% of the proposals fall within a very important level, which comes in the forefront preserving the genetic traits of the seeds and prevent their degradation by mixing with weed seeds, with average importance of 3.79. And that 43% fall within an important level, comes at the forefront continuing for developing new varieties more

Table 5: The Proposals in the programs area.

No.	Proposals	Importance means
1	Preparing and implementing a national development program for the development of barley cultivation in the country, in line with other national programs, including the development and dissemination of varieties, the use of micro fertilizers, water management, and soil management.	3.58
2	Continuing the current program of high-grade barley seeds, so as to cover all farmers and leave dependence on local seeds.	3.45
3	Preparing a crop protection program that includes control campaigns covering all areas of barley cultivation and providing appropriate pesticides	3.39
4	Preparing an integrated program for agricultural equipment for the crop.	3.3
5	Preparing an integrated research program for all related to the development of barley cultivation and its productivity.	3.27
6	Preparing an integrated extension program for promoting and disseminating of crop varieties and technologies.	3.09

Table 6: The Proposals in the technical area.

No.	Proposals	Importance means
1	Preserving the genetic characteristics of barley seeds and preventing their degradation by mixing with weed seeds.	3.79
2	Varieties by producing high-grade seeds Preserving.	3.64
3	The need to choose the most effective and safer pesticides for barley pests.	3.61
4	Pay attention to technologies that reduce the impact of climate change.	3.52
5	Continuing to developing new varieties more suitable for farm systems and more productive.	3.39
6	Emphasizing on Integrated Pest Management.	3.3
7	Studies in the value chain of barley crop.	3.21

suitable for farm systems and more productive with an average of 3.39 (Table 6).

Table 6 concludes that there is a need to develop the technical field in the agricultural innovation system, which is the responsibility of the centers of scientific research mainly from the provision of seeds of high grade and effective pesticides and conducting research and studies.

Organizational area

The results show that there are 6 proposals in the organizational area from the agricultural researcher's point of view, their means ranged between (3.12-3.42) with an average of 3.26. All the proposals fall within an important level, which comes in the forefront of coordinating with the colleges of agriculture and international research centers through organizing workshops and seminars with an average of the importance of 3.42, Formatting an integrated team for a barley development program with average importance of 3.36 (Table 7).

Table 7 clarify the necessity of developing the organizational field in the agricultural innovation system is determined by the coordination between the components of the system and the formation of sections and units for the development of barley cultivation.

Support area

The results show that there are 4 proposals in the support area from the agricultural researcher's point of view. Their means ranged between (3.55-3.79) with an average of 3.58. All the proposals in the field of support fall within a very important level. Which comes in the forefront of the proposals, subsidizing the prices of the sale of seeds of the high- grades of barley varieties for farmers with an average of 3.79 (Table 8).

Table 8 clarify the need to pay attention to crop price policies and provide the necessary support to farmers by supporting the prices of seeds and agricultural equipment and support of agricultural researchers by appreciating their efforts.

Farmer area

The results show that there are 8 proposals in the farmer area from the agricultural researcher's point of view. Their means ranged between (3.15-3.42) with an average of 3.23. All the proposals fall within an important level. The first is to contract with the farmers who produce high-grade seeds of barley and to provide necessary support to them with an average of 3.42 (Table 9).

Table 9 indicates that there is a need to pay attention

Table 7: The Proposals in the organizational area.

No.	Proposals	Importance means
1	Coordinating with agricultural colleges and international research centers through organizing workshops & conferences.	3.42
2	Formatting the Integrated team for Barley Development Program in the case of implementation of the program.	3.36
3	Formatting an integrated team to produce high- grade seeds for barley varieties, including the private sector.	3.24
4	Formatting the specialized extension team to carry out the planning and implementing of barley activities	3.21
5	Formatting the integrated research team in the field of barley.	3.18
6	Establishing a special unit or section for barley in Agricultural Research Departments.	3.12

Table 8: The Proposals in the support area.

No.	Proposals	Importance means
1	Supporting prices of sale the high- grade barley seeds for the farmer.	3.79
2	Supporting seed purchase prices of the farmer.	3.58
3	Supporting the prices of agricultural equipment for all farmers	3.39
4	Appreciating the efforts of researchers and workers in AIS	3.55

Table 9: The Proposals in the farmer area.

No.	Proposals	Importance means
1	Contracting with the farmers who produce high-grade seeds.	3.42
2	Developing the capacity of farmers to adopt technologies related to barley and agricultural practices.	3.39
3	Providing integrated crop services for all farmers (prevention, processing, extension, and marketing).	3.36
4	Preparing the programs and training courses necessary to develop the abilities and skills of the farmers.	3.36
5	Achieving the participation of farmers and their representatives in the processes and activities of the system, especially identifying their problems.	3.24
6	Encouraging the farmers to innovate and disseminate innovations widely among farmers.	3.18
7	Accelerating and expanding of the dissemination of innovations in all areas of crop cultivation.	3.18
8	Achieving the participation of farmers in selecting solutions and adapting them in their fields.	3.15

to farmers and provide the necessary services for the development of barley cultivation because they are a basic component of the agricultural innovation system.

Services area

The results show that there are 6 proposals in the services area from the agricultural researcher's point of view. Their means ranged between (3-3.39) with an average of 3.28. All improvement proposal falls within an important level. The first is improving the services of agricultural equipment in terms of providing supplies to cover all farmers of seeds, fertilizers, and pesticides with an average of 3.39 (Table 10).

Table 10 illustrates the need to improve the services of the agricultural innovation system and all its components in order to develop barley cultivation.

Monitoring and evaluation area

The results show that there are 4 proposals in the monitoring and evaluation area from the agricultural researcher's point of view. Their means ranged between (3.06-3.27) with an average of 3.16. All the proposals fall within an important level. Which comes in the forefront of monitoring and continuous evaluation of the work, programs, and activities carried out by the components of the innovation system in the field of barley growing, with an average of 3.27 (Table 11).

Table 11 shows the need for comprehensive monitoring and evaluation for all programs and elements of the agricultural innovation system for the development of barley cultivation.

Financial allocations area

The results show that there are 6 proposals in the financial allocations area from the agricultural researcher's point of view. Their means ranged between (3.27-3.67) with an average of 3.52. 50% of the proposals

Table 10: The proposals in the services area.

No.	Proposals	Importance means
1	Improving the services of agricultural equipment in terms of providing supplies to cover all farmers of seeds, fertilizers, and pesticides.	3.39
2	Improving the marketing services for barley in terms of storage capacity, preparing the silos and improving the storage conditions.	3.39
3	Increasing and improving specialized barley growing services.	3.36
4	Improving plant protection services.	3.3
5	Improving agricultural extension services.	3.21
6	Increasing loans and financial support to barley farmers.	3

Table 11: The proposals in the monitoring and evaluation area.

No.	Proposals	Importance means
1	Continuing monitoring and evaluation of the work, programs, and activities carried out by the components of the AIS.	3.27
2	Adopting objective criteria and indicators for M&E.	3.18
3	The need for an organizational unit or team responsible for M&E.	3.12
4	Using M&E results for developing new programs.	3.06

Table 12: The proposals in the financial allocations area.

No.	Proposals	Importance means
1	Sustainability of financial allocations for seed production.	3.67
2	Increasing the financial allocations for agricultural scientific research in general and barley research in particular.	3.64
3	Sustainability of financial allocations in barley research.	3.64
4	Increase financial allocations for producing seeds from the high-grades of barley varieties.	3.45
5	Increasing the financial allocations for experiments in farmers' fields.	3.42
6	Increasing financial allocations for extension programs.	3.27

fall within a very important level. Mainly, the sustainability of financial allocations in the field of seed production with an average of 3.67. And that 50% of the proposals fall within an important level. Firstly, increasing the financial allocations for seed production with an average of 3.45 (Table 12).

Table 12 summarizes the need to provide financial allocations for the AIS along the crop innovation processes.

Conclusion

From the results, we can conclude that AIS needs Improving in all its areas (the general framework of the system, innovation net, human and material capacities, programs, technical field, policy and support, farmer, services, monitoring and evaluation, and financial allocations). The mission should be done by the decision maker by adopting the results to develop the system in order to develop barely cultivation in Iraq.

References

Al-Arabia, (2017). Importing of feed for Almarai Company. Available on:

http://www.alarabiya.net/ar/aswaq/2017/01/10

Al- Hakim, A.H.N. (2013). Studies in Iraqi agriculture (Part I) Future agriculture. Ministry of agriculture: Iraq.

Al-Fatalawi, R.S and H.K. Al-Taiy (2018). Problems Facing the Spread of Agriculture in Green Houses in Al-Qadisiyah Province. *The Iraqi Agriculture Research*, **23(2):** 221-207.

Bauer, M., G. Lardy, K. Swanson amd S. Zwinger (2017). Barley Grain and Forage for Beef Cattle,North Dakota State University. Available on:https://www.ag.ndsu.edu/publications/livestock/barley-grain-and-forage-for-beef-cattle/as1609.pdf

EU, S. (2013). Agricultural Knowledge and Innovation Systems Towards 2020-an Orientation Paper on Linking Innovation and Research, Brussels.

Federal Ministry of Food & Agriculture of Germany (2015). Understanding Global Food Security and Nutrition. Available on :https://www.bmel.de/SharedDocs/

Downloads/EN/Publications/Understanding Global Food.pdf?__blob=publicationFile

Food and Agricultural Organization of the United Nations (FAO, 2014.Building a Common Vision for Sustainable Food and Agriculture, Principles& Approaches.Rome.Available on:http://www.fao.org/3/a-i3940e.pdf.

Food and Agricultural Organization of the United Nations (FAO) (2014). Approaches to strengthening Agricultural Innovation Systems in Central Asia, South Caucasus and Turkey. Rome. Available on:www.fao.org/nr/research-extension -systems/res-home/

Food and Agriculture Organization of the United Nations (2017). The Future of Food and Agriculture Trends and Challenges. Available online: http://www.fao.org/3/a-i6881e.pdf

Food and Agriculture Organization of United Nations, 2018.Facilitating Capacity Development for Agricultural Innovation. Available online: http://www.fao.org/in-action/tropical-agriculture-platform/en/

Gulf Center for Studies (2016). Import of feed. Available online:

http://www.alkhaleej.ae/alkhaleej/page/3d516e9c-7035-4ffd-8020-35ce871ddd8e

Hristov, M. (2011). The Agricultural Innovation System: The Knowledge Issues in the Bulgarian Agricultural Sector. Aalborg University. Denmark.

Jose, S. (2014). Innovation in Agriculture: a Key Process for Sustainable Development IICA..Available online:http://repositorio.iica.int/bitstream/11324/2607/1/BVE17038694i.pdf

Ministry of Planning (2009). National Development Plan 2010-2014.Iraq.

Ministry of Planning (2013). National Development Plan 2013-2017.Iraq.

Ministry of Planning (2018). National Development Plan 2018-2022.Iraq.

Ministry of Agriculture / Planning and Monitoring Department, 2015. Strategic Plan of the Ministry of Agriculture for the years 2015-2025. Iraq.

Ministry of Planning (2017). Production of wheat and barley 2017. Iraq.

Organization for Economic Co-operation and Development (OECD) (2013). Agricultural Innovation Systems: A framework for Analyzing the Role of The Government.

Organization for Economic Co-operation and Development (OECD) (2016). Adapting Innovation Systems to New Challenges. Available online: https://www.oecd.org/tad/policynotes/adapting-innovation-systems-new-challenges.pdf

Rogers, E.M. (2003). Diffusion of Innovations. Published by Simon & Schuster.New York.

Tropical Agriculture Platform (TAP) (2016). Common Framework on Capacity Development for Agricultural Innovation Systems: Conceptual Background. Rome.

World Bank (2014). Agricultural Innovation Systems: An Investment source Book. Washington. World Bank.