

The Role of Agricultural Extension in Improving Tomato Productivity and Marketing from the Perspective of Farmers in Balad District, Salah al-Din Governorate

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Abstract

This research aims to study the role of agricultural extension in improving the productivity and marketing of tomato crops from the perspective of farmers in Balad District, Salah al-Din Governorate. The study adopted a descriptive-analytical approach and used a questionnaire consisting of 32 items distributed across four domains: extension, production, marketing, and obstacles. A five-point Likert scale (1–5) was used. Data were collected during January 2026 from a sample of 98 farmers and analyzed using frequencies, percentages, arithmetic means, and standard deviations. A one-way ANOVA (F-test) was also used to measure statistical differences. The results showed that the level of agricultural extension's role was moderate, tending towards high, with its role being more prominent in production aspects compared to marketing aspects. The results also revealed the presence of major obstacles, most notably weak marketing, high production costs, water scarcity, and the spread of agricultural pests. The statistical analysis revealed significant differences based on age and years of experience, while no differences were found based on educational level or farm size. The research concludes that agricultural extension contributes to improved production and marketing, but its tools need to be developed and its marketing role strengthened to address agricultural challenges in the study area. The research recommends enhancing the role of agricultural extension by increasing the number of field visits to farmers in Balad District and developing extension programs that focus on the marketing aspect of tomato production, not just production.

Keywords: Agricultural extension, productivity and marketing, tomato crop, Salah al-Din Governorate.

Introduction

The agricultural sector is one of the main pillars in achieving food

security and economic development in developing countries, including Iraq, as it contributes directly to providing food and reducing dependence on imports, Data from the Food and Agriculture Organization (FAO) indicates that Iraq possesses large agricultural resources of arable land estimated at 11 million hectares, but the actual utilization rate is still less than the available potential due to water challenges, soil degradation, and weak agricultural infrastructure [10]. In this context, agricultural extension is one of the most important tools for modern agricultural development, as it represents the link between scientific research and farmers. It aims to increase production efficiency and improve the use of agricultural resources by disseminating modern technologies and modifying farmers' agricultural practices [16, 15]. Furthermore, recent literature confirms that the effectiveness of agricultural extension is linked to its integration with farmers' needs and its use of modern and participatory communication methods [7].

Tomatoes are among the most important vegetable crops in Iraq and the world, classified as crops of high nutritional and economic value, they constitute an important part of the daily diet and the food industry,

FAO data indicates that global tomato production exceeds 180 million tons annually, reflecting their strategic importance to global food security [10]. Despite this, tomato production in Iraq faces significant fluctuations, reaching approximately 630,000 tons in 2022, with notable variations in previous years due to environmental conditions and inadequate production techniques [9].

Recent studies confirm that the decline in tomato productivity in agricultural environments is due to several factors, including the weak application of good agricultural practices, inefficient irrigation and fertilization management, the spread of pests and diseases, and limited access to modern extension recommendations [6, 8]. Furthermore, the results of applied studies in developing environments indicate that adopting extension recommendations directly contributes to increased productivity and improved crop quality [7].

From a marketing perspective, tomato farmers face challenges including a weak marketing infrastructure, the high role of intermediaries, and a lack of accurate market information. This leads to lower economic returns for farmers and increased post-harvest losses. [16]. confirmed that expanding agricultural extension

services to include marketing aspects contributes to improving farmers' incomes and reducing marketing losses.

In the Iraqi context, recent studies indicate that the level of implementation of extension recommendations in tomato production remains below the required level due to the limited scope of extension programs, weak communication between agricultural extension agents and farmers, and inadequate practical training [3, 4]. Other studies have shown that the degree of benefit derived from agricultural extension varies according to personal variables such as age, experience, and farm size [14].

Tomatoes are an important economic crop in Iraq due to their nutritional and strategic value. However, they face numerous production and marketing challenges, such as high production costs, weak marketing infrastructure, and price volatility in local markets [11].

Environmental factors are key determinants of the productivity and quality of vegetable crops, particularly tomatoes. Plant physiological processes are affected by temperature, light intensity, relative humidity, and carbon dioxide concentration. These factors directly impact fruit characteristics

such as size, firmness, nutritional content, and taste. Any disruption to these environmental conditions can lead to decreased productivity and reduced crop quality. Conversely, careful control of these factors, especially in protected cultivation systems, contributes to improved growth, increased production efficiency, and enhanced fruit quality [12].

Despite the expansion of studies related to agricultural extension, most have focused on measuring the general role of extension in agricultural development or in field crops. Studies specifically addressing tomatoes within the context of the link between production and marketing in a local environment like Balad District remain limited. Furthermore, previous studies have not adequately addressed the relationship between agricultural extension and production and marketing obstacles from the perspective of farmers themselves in agricultural environments facing economic and climatic pressures, such as Salah al-Din Governorate.

Therefore, the research gap lies in the need for a modern analytical field study that measures the role of agricultural extension in improving tomato production and marketing, while also analyzing the impact of farmers' personal variables on their

perception of this role. Hence, the research question is: What is the role of agricultural extension in improving tomato production and marketing from farmers' perspectives in Balad District, Salah al-Din Governorate?

Research Objectives

1- To identify the level of agricultural extension's role in improving tomato productivity and marketing from the perspective of farmers in Balad District, Salah al-Din Governorate, in general.

2- To identify the level of agricultural extension's role in improving tomato productivity and marketing according to the areas of extension, production, marketing, and obstacles, from the perspective of farmers in Balad District, Salah al-Din Governorate.

3- To determine the correlation between the role of agricultural extension in improving tomato productivity and marketing from the perspective of farmers in Balad District, Salah al-Din Governorate, and some personal and economic variables of the farmers, namely (age, education, years of experience, and landholding size).

Research Hypotheses

There are statistically significant differences in farmers' assessments of the role of agricultural extension according to the variables (age,

education, years of experience, and landholding size).

Operational Definitions

- Agricultural extension: Organized efforts to transfer agricultural knowledge to farmers to improve production and marketing.

- Productivity: The quantity of production achieved per unit area.

Agricultural marketing: All activities related to transporting the product from the farm to the end consumer.

Research Methodology

The survey method, part of the descriptive approach, was used in this research to interpret the relationships between variables. This method aims to describe and explain the phenomena or topics under study. Data on these phenomena were collected using a variety of research methods, including observation, interviews, questionnaires, and content analysis. The data was then presented in detail in the final report [13].

-Research Population

The number of tomato farmers in Balad District, Salah al-Din Governorate Agriculture Directorate, is 294. After excluding the pilot sample of 25 farmers, who were not included in the study, the total number of participants was 98,

representing 33% of the research population.

-Data Collection Tool

A questionnaire was used to collect data from tomato farmers, as it is one of the most commonly used methods for data collection [2]. The questionnaire was initially developed after reviewing scientific sources, previous studies, and research related to agricultural extension, and consulting with university professors and specialists in the field. Based on this review, the questionnaire consisted of two parts to achieve the research objectives. The first part included the demographic characteristics of the farmers included in the study: age, education, years of experience, and landholding size. The second part of the study, which examined the role of agricultural extension in improving tomato production and marketing from farmers' perspectives in Balad District, Salah al-Din Governorate, comprised 32 items. These items were distributed across four domains: extension, production, marketing, and obstacles. A five-point scale, constructed according to the Likert scale, was used to measure responses. The weights assigned to each respondent were 1, 2, 3, 4, and 5 points (Strongly disagree, disagree, neutral, agree, strongly agree), respectively, based on the

actual range of total scores. The categories were determined according to the range formula. Since the item scale was 1–5, the following applies:

- Range = $5 - 1 = 4$
- Number of categories = 3
- Category length = $4 \div 3 = 1.33$

The categories then become:

- Low (1.00 – 2.33)
- Medium (2.34 – 3.67)
- High (3.68) – 5.00)

The SPSS statistical software was used for social research, along with some statistical methods such as percentage, arithmetic mean, and range, to analyze the research data.

- Validity and Reliability of the Scale

This involves confirming the results of the scale test, its reliability, and its degree of stability or retention and internal consistency between items for the scores achieved by the measurement instrument if it is reused over time [15]. To examine reliability, a pre-test was conducted on a sample of (25) respondents from the study population who were not part of the study population. This was done to verify the reliability of the scales and items included in the questionnaire. To measure reliability statistically, the initial test data were analyzed using Cronbach's alpha, which yielded a value of 0.942. This value was (0.75%), which is the lowest

statistically acceptable value in social research [1]. Data were collected at the beginning of January 2026.

Study Limitations

- Geographical Limitations: Balad District / Salah al-Din Governorate.
- Human boundaries: Tomato farmers.
- Temporal boundaries: Tomato growing seasons.
- Thematic boundaries: The role of agricultural extension in tomato production and marketing.

Results and Discussion

First Objective: To identify the level of agricultural extension's role in

Table 1. General Distribution by Respondents' Level of Agreement.

Categories	Number	(%)	Arithmetic mean	Standard deviation
Low (1.00 – 2.33)	18	18.37	3.41	0.78
Medium (2.34 – 3.67)	52	53.06		
High (3.68 – 5.00)	28	28.57		
Total	98	100%		

Table 1 indicates that the role of agricultural extension in improving tomato productivity and marketing, from the perspective of farmers in Balad District, Salah al-Din Governorate, was generally moderate, tending towards high. This is attributed to the fact that most respondents indicated the existence of acceptable extension services that contribute to improving some aspects of production and marketing.

improving tomato production and marketing from the perspective of farmers in Balad District, Salah al-Din Governorate.

The results showed that respondents were distributed according to their level of appreciation of the role of agricultural extension in improving tomato production and marketing in general. 18.37% fell into the low category, 53.06% into the medium category, and 28.57% into the high category, based on the range law. The arithmetic mean was calculated as 3.41, while the standard deviation was 0.78, as shown in Table 1.

However, these services still need strengthening and expansion in the areas of field visits, training, and the provision of up-to-date marketing information. This resulted in the overall rating remaining within the moderate category, rather than being fully high.

The second objective was to identify the level of the role of agricultural extension in improving tomato productivity and marketing

according to the areas of extension, production, marketing, and obstacles, from the perspective of farmers in Balad District, Salah al-Din Governorate.

First Area: Extension

The results related to the extension area showed that respondents' responses regarding the role of agricultural extension were

Table 2. Level of Agricultural Extension (Extension Area).

Categories	Number	(%)	Arithmetic mean	Standard deviation
Low (1.00 – 2.33)	20	20.41	3.38	0.81
Medium (2.34 – 3.67)	50	51.02		
High (3.68 – 5.00)	28	28.57		
Total	98	100%		

The results in Table 2 indicate that the level of agricultural extension's role in the extension field, from the farmers' perspective, was moderate, tending towards high. This is attributed to the availability of acceptable extension services, such as field visits and the provision of agricultural information. However, these services still need strengthening in terms of regularity, coverage, and inclusion of all farmers, which resulted in the assessments remaining at the moderate level.

Second: The Production Field

distributed across three categories according to the range law. It was found that 20.41% fell within the low category, 51.02% within the moderate category, and 28.57% within the high category. The mean score for this area was 3.38, while the standard deviation was 0.81, as shown in Table 1.

The results related to the production field showed that the respondents' responses regarding the role of agricultural extension in improving tomato crop productivity were distributed according to the range law. It was found that 17.35% fell within the low category, while 54.08% fell within the medium category, and 28.57% fell within the high category. The arithmetic mean for this field was 3.45, while the standard deviation was 0.76, as shown in Table 3.

Table 3. Level of the Role of Agricultural Extension (Production Field)

Categories	Number	(%)	Arithmetic mean	Standard deviation
Low (1.00 – 2.33)	17	17.35	3.45	0.76
Medium (2.34 – 3.67)	53	54.08		
High (3.68 – 5.00)	28	28.57		
Total	98	100%		

Table 3 indicates that the level of agricultural extension's role in production, from the farmers' perspective, was moderate, tending towards high. This is attributed to agricultural extension's contribution to improving certain agricultural practices, such as variety selection, planting dates, fertilization, and pest control. However, this role still needs further enhancement to reach a higher level.

Third: The Marketing Sector

Table 4. Level of the Role of Agricultural Extension (Marketing Sector).

Categories	Number	(%)	Arithmetic mean	Standard deviation
Low (1.00 – 2.33)	22	22.45	3.30	0.84
Medium (2.34 – 3.67)	48	49.00		
High (3.68 – 5.00)	28	28.57		
Total	98	100%		

Table 4 indicates that the level of agricultural extension's role in marketing, from the farmers' perspective, was moderate to high.

The results related to the marketing sector showed that respondents' answers regarding the role of agricultural extension in improving tomato marketing were distributed according to the range law. 22.45% fell within the low category, 49.00% within the medium category, and 28.57% within the high category. The arithmetic mean for this sector was 3.30, while the standard deviation was 0.84, as shown in Table 4.

This is attributed to the extension's contribution in providing some information related to marketing, determining selling times, and

reducing losses. However, the weakness of the marketing infrastructure and price volatility further limited the effectiveness of this role.

Fourth: Obstacles

The results related to obstacles showed that the respondents' responses were distributed

Table 5: Level of Obstacles Facing Farmers

Categories	Number	(%)	Arithmetic mean	Standard deviation
Low (1.00 – 2.33)	19	19.38	3.36	0.79
Medium (2.34 – 3.67)	51	52.04		
High (3.68 – 5.00)	28	28.57		
Total	98	100%		

The results in Table 5 indicate that the level of obstacles facing tomato farmers in Balad District was moderate, tending towards high. This suggests the presence of production, marketing, and extension problems affecting farmers' work, necessitating a strengthened role for agricultural extension in addressing these issues and mitigating their effects, as shown in Table 6. The results related to the obstacles showed that respondents' answers regarding the obstacles facing tomato farmers in Balad District varied according to the range law. Three categories (low, medium, and high) were adopted, consistent

according to the range law. It was found that 19.38% fell within the low category, 52.04% within the medium category, and 28.57% within the high category. The arithmetic mean for this area was 3.36, while the standard deviation was 0.79, as shown in Table 5.

with the overall distribution of the domain. The items were ranked according to their relative importance, highlighting the most significant obstacles faced by farmers.

Table 6: Obstacles Facing Tomato Farmers Ranked by Importance

S	Paragraph	Number	%	Relative importance	Ranking
1	Weak marketing due to the presence of imported crops.	72	73.47	0.86	1
2	High production costs limit profitability.	68	69.38	0.83	2
3	Water scarcity reduces production.	65	66.33	0.81	3
4	Pest and disease outbreaks cause losses.	63	64.29	0.79	4
5	Insufficient availability of production inputs.	60	61.22	0.77	5
6	Weak extension services affect production.	58	59.18	0.75	6
7	Infrequent visits by extension agents to farmers.	55	56.12	0.73	7
8	Competition with imported products has an impact.	52	53.06	0.71	8

Table 6 indicates that the most significant obstacles facing tomato farmers in Balad District were weak marketing and high production costs. These received the highest percentages and relative importance compared to the other items, while obstacles such as competition from imported products and weak extension services ranked relatively lower. This demonstrates that economic and marketing obstacles represent the greatest challenge for farmers

compared to extension and production obstacles.

The third objective is to determine the correlation between the role of agricultural extension in improving tomato productivity and marketing from the perspective of farmers in Balad District, Salah al-Din Governorate, and some personal and economic variables of the farmers, namely (age, education, years of experience, and landholding size).

Age: There are statistically significant differences in farmers'

perceptions of the role of agricultural extension in improving tomato productivity and marketing based on the age variable. The results regarding the distribution of respondents by age variable showed that 14.29% of farmers were under 30 years old, 26.53% were 30–40 years old, 32.65% were 41–50 years old, and 26.53% were over 50 years old. Thus, the

largest age group was 41–50 years old.

To analyze the differences in respondents' perceptions of the role of agricultural extension, the arithmetic mean, standard deviation, F-value, and significance level (Sig.) were used. The overall mean was then used to determine the level of perception, as shown in Table 8.

Table 8. Analysis of Differences in Perceptions of the Role of Agricultural Extension by Age Group (n = 98)

Age groups	number	%	arithmetic mean	standard deviation	F value,	Sig.
Less than 30	14	14.29	3.41	0.78	2.91	0.041
30-40	26	26.53				
41-50	32	32.65				
More than 50	26	26.53				
Total	98	100%				

Table 8 shows statistically significant differences in farmers' perceptions of the role of agricultural extension in improving tomato productivity and marketing based on age. The p-value (Sig = 0.041), which is less than 0.05, indicates significant differences between age groups. The overall mean was 3.41 and the standard deviation was 0.78, suggesting a moderate to high overall rating. Therefore, the alternative hypothesis is accepted.

Second: Educational Level

Hypothesis: There are statistically significant differences in farmers'

perceptions of the role of agricultural extension in improving tomato productivity and marketing based on their educational level.

The results regarding the distribution of respondents by educational level showed that 12.24% of farmers were literate, while 20.41% had a primary education, 25.51% had an intermediate education, 24.49% had a preparatory education, and 17.35% had a diploma or higher. Thus, it is clear that the majority of farmers fall within the intermediate educational level.

To analyze the differences, the arithmetic mean, standard deviation, F-value, and

significance level (Sig.) were used, as shown in Table 9.

Table 9. Analysis of Differences in the Assessment of the Role of Agricultural Extension by Educational Level (n = 98)

Educational Level	number	%	arithmetic mean	standard deviation	F value,	Sig.
Reads and Writes	12	12.24	3.41	0.78	1.88	0.121
Primary	20	20.41				
Intermediate	25	25.51				
Preparatory	24	24.49				
Diploma or Higher	17	17.35				
Total	98	100%				

Table 9 shows that there are no statistically significant differences in farmers' perceptions of the role of agricultural extension in improving tomato productivity and marketing based on their educational level. The p-value (Sig = 0.121) is greater than 0.05, indicating that the differences between educational levels are not significant. This is attributed to the similarity in farmers' understanding of the importance of agricultural extension, regardless of their educational level, suggesting a relative homogeneity in responses.

Third: Years of Agricultural Experience

Hypothesis: There are statistically significant differences in farmers'

perceptions of the role of agricultural extension in improving tomato productivity and marketing based on their years of experience. The results related to years of experience show that 18.37% of farmers have less than 5 years of experience, while 27.55% have 5–10 years, 30.61% have 11–15 years, and 23.47% have more than 15 years. This indicates that most farmers possess moderate to high levels of experience in tomato cultivation.

To test for differences, the arithmetic mean, standard deviation, F-value, and significance level (Sig.) were used, as shown in Table 10.

Table 10. Analysis of Differences in the Assessment of the Role of Agricultural Extension by Years of Experience (n = 98)

Years of experience	number	%	arithmetic mean	standard deviation	F value,	Sig.
Less than 5	18	18.37	3.45	0.76	2.64	0.048
5 – 10	27	27.55				
11 – 15	30	30.61				
More than 15	23	23.47				
Total	98	100%				

Table 10 shows statistically significant differences in farmers' perceptions of the role of agricultural extension in improving tomato productivity and marketing based on years of experience. The p-value (Sig = 0.048), which is less than 0.05, indicates significant differences between experience levels. The overall mean was 3.45, and the standard deviation was 0.76, suggesting that farmers with more experience were more aware of the role of agricultural extension than those with less experience.

Fourth: Farmhold Size

Hypothesis: There are statistically significant differences in farmers' perceptions of the role of agricultural extension in improving tomato productivity and marketing based on farmhold size. The results showed that 33.67% of farmers owned small holdings, 40.82% owned medium holdings, and 25.51% owned large holdings. This indicates that the majority of farmers own medium-sized holdings. To analyze the differences, the arithmetic mean, standard deviation, F-value, and significance level (Sig.) were used, as shown in Table 11.

Table 11. Analysis of Differences in the Estimated Role of Agricultural Extension According to Holding Size (n = 98)

Size of holding	number	%	arithmetic mean	standard deviation	F value,	Sig.
Small	33	33.67	3.40	0.79	1.92	0.109
Medium	40	40.82				
Large	25	25.51				
Total	98	100%				

Table 11 shows that there are no statistically significant differences in farmers' perceptions of the role of agricultural extension based on the size of their farms. The p-value (Sig =

Summary of Chapter Four

This chapter presents and analyzes the results of the study concerning the role of agricultural extension in improving the productivity and marketing of tomato crops from the perspective of farmers in Balad District, Salah al-Din Governorate. Frequencies, percentages, arithmetic means, and standard deviations were used, and one-way ANOVA (F-test) was used to test for differences.

The results showed that the overall level of agricultural extension was moderate, tending towards high, indicating a positive role for agricultural extension in improving

Conclusions

In light of the study's findings, the following conclusions can be drawn:

1. The level of agricultural extension's role in improving tomato production and marketing was moderate, tending towards high, from the farmers' perspective.
2. Agricultural extension contributes significantly to improving some agricultural practices, such as production and the use of modern technologies. However, its role in marketing remains less effective.
3. There are statistically significant differences in farmers' perceptions of the role of agricultural extension based

0.109) is greater than 0.05, indicating that the differences are not significant. This is attributed to the similarity in farmers' utilization of extension services regardless of farm size.

some aspects of production and marketing. However, it still needs further enhancement to reach a high level. The results also showed statistically significant differences according to the variables of age and years of experience, while no significant differences appeared according to the variables of educational level and size of agricultural holding, indicating that farmers' perception of the role of agricultural extension is more affected by age and experience compared to the rest of the variables.

on age, with older farmers being more aware of this role.

4. There are significant differences based on years of experience, indicating that those with more experience are more aware of the importance of agricultural extension.
5. There are no statistically significant differences based on educational level, suggesting a similar level of awareness among farmers regardless of their education.
6. There are no significant differences based on farm size, indicating that extension services reach all farmers equally.
7. Production and marketing obstacles continue to affect the level of utilization

of agricultural extension in Balad

Recommendations

In light of the findings, the research recommends the following to the relevant authorities in the Salah al-Din Agriculture Directorate:

1. Strengthen the role of agricultural extension by increasing the number of field visits to farmers in Balad District.
2. Develop extension programs that focus on the marketing aspect of tomato production, not just production.
3. Adopt modern communication methods (messages, applications, digital platforms) to deliver extension information to farmers.

District.

4. Organize ongoing training courses for farmers on improving production and marketing.
5. Focus on transferring modern agricultural technologies to contribute to increased productivity and reduced costs.
6. Address marketing obstacles through coordination with relevant entities involved in crop marketing.
7. Focus on less experienced farmers through intensive extension programs to raise their awareness.

References

1. Abdul Rahman, Abdullah Muhammad, and Muhammad Ali Al-Badawi, 2024, *Methods and Approaches of Social Research*, 1st ed., Dar Al-Kutub, Cairo.
2. Abu Al-Nasr, Medhat Muhammad, (2017), *Research Methods in Social Work*, Arab Group for Training and Publishing, First Edition, Helwan University.
3. Al-Azzawi, M. A., & Al-Jumaily, M. H. (2022). Application of agricultural recommendations in tomato cultivation in Iraq.
4. Al-Hamdany, M. H. S. (2024). Farmers' knowledge of tomato production practices in Iraq. <https://doi.org/10.33545/26180723.2024.v7.i9g.1108>
5. Christoplos, I. (2010). Mobilizing the potential of rural and agricultural extension. FAO. <https://doi.org/10.22004/ag.econ.94137>
6. Colla, G. et al. (2017). Sustainable tomato production systems. *Agronomy for Sustainable Development*. <https://doi.org/10.1007/s13593-016-0415-9>
7. Davis, K. et al. (2012). Impact of farmer field schools. *World Development*. <https://doi.org/10.1016/j.worlddev.2011.05.019>
8. Dorais, M. et al. (2011). Tomato crop management and productivity. *Acta Horticulturae*. <https://doi.org/10.17660/ActaHort.2011.914.1>
9. FAO (2023). FAOSTAT Agricultural Production Data. <https://www.fao.org/faostat>

- 10.FAO (2023). Iraq Agriculture Overview.
<https://www.fao.org/iraq/>
- 11.Gruda, N. (2005). Impact of environmental factors on tomato production. *Scientia Horticulturae*.
<https://doi.org/10.1016/j.scienta.2005.01.008>
- 12.Gruda, N. (2010). Impact of environmental factors on tomato production. *Scientia Horticulturae*.
<https://doi.org/10.1016/j.scienta.2010.03.001>
- 13.Murad, Salah, Fawzia Hadi, 2018, Scientific Research Methods, Designs and Procedures, Dar Al-Kitab Al-Hadith, Department of Educational Psychology, College of Education, Kuwait.
- 14.Rivera, W. M., & Alex, G. (2010). Extension reform for rural development. *Journal of Agricultural Education and Extension*.
<https://doi.org/10.1080/1389224X.2010.505995>
- 15.Sarantakos, Sotirios, 2017, Social Research, 1st ed., Arab Center for Research and Policy Studies, Tarjuman Series, Cairo.
- 16.Swanson, B. E., & Rajalahti, R. (2010). Strengthening agricultural extension systems. World Bank.
<https://doi.org/10.1596/978-0-8213-8280-1>