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# The Role Of Agricultural Extension Centers In Tomato Production And Marketing In Sulaymaniyah Governorate In Kurdistan Region- Iraq

**Sara B.Mohamed**[1] **Tahir M. L.Hasan**[1]
**Chawan M. Hamasalih**[1] **Kazhan J. Hassan**[1]
[1]*Dept. of Agribusiness and Rural Development, College of Agric. Engg. Sciences, Univ. of Sulaimani, Kurdistan Region, IRAQ.*
*Corresponding Author: tahir.layeeq@univsul.edu.iq.

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## ABSTRACT

The research aims primarily to identify the role of agricultural extension centers in the production and marketing of tomato in Sulaymaniyah Governorate, as well as determine the variance between the role of agricultural extension centers in tomato production and marketing according to some variables represented by (Age, Academic specialization, Academic achievement, Duration of agricultural extension service, and Participation of Training courses ), in addition identifying the problems facing the process of tomato production and marketing. The research population included all agricultural extension workers in the Agricultural Extension Directorate and its affiliated centers in Sulaymaniyah Governorate, numbering (100) agricultural extension workers. After excluding (16) respondents from them for being included in the survey sample, the number of those included in the research sample became (84) respondents representing the research population. The result sheds light on the level of the role of agricultural extension centers in tomato production and marketing is high. The results indicated that there is no difference in the opinions of agricultural extension workers regarding the role of agricultural extension centers in both tomato production and marketing according to the research variables (Age, Academic achievement, Academic specialization, Duration of agricultural extension service), while variations were observed among the variable (Participation of Training courses). The research results also indicated the existence of many problems facing the process of producing and marketing tomatoes, the most important of which are the high costs of seeds, fertilizers, pesticides, labor, and importing tomatoes from abroad, consequently, the researchers suggested offering training for agricultural extension workers and initiating media awareness campaigns to educate farmers about the functions of extension centers.

***Keywords*:** *Agriculture, agricultural extension, farmer, tomato, Agricultural Extension Centers*.



## INTRODUCTION

The agricultural sector is considered one of the basic economic pillars that support the economies of many countries, whether developed or developing. Despite the major scientific and technological developments currently witnessed by the world [1], achieving food security and increasing agricultural production remain key priorities that require intensive attention at all global levels [2, 3]. Furthermore, developing the agricultural sector and adopting modern production methods are not just goals for developing countries; they are essential for achieving sustainable and comprehensive economic development[2], therefore Agricultural development is an integral part of economic development, and most of the experiences in this regard indicate that there are few countries in the world that have achieved economic development without growth in the agricultural sector, At the same time, most of the countries that faced their problems and achieved progress in their economy were the result of the development that accompanied their agriculture [4].Governments all around, including those of underdeveloped nations, have realized how important government agencies especially agricultural extension centers are in advancing agricultural development. [5] By means of their multifarious purposes, which include human resource development through training programs, these extension centers have great capacity to support rural development [6, 7, 8, 9, 10, 11]. Agricultural extension is an essential element in enhancing productivity and achieving sustainable development in rural communities, through

transferring knowledge and modern technologies to farmers, improving the livelihoods of rural families, increasing income, enhancing food security, and developing human capacities and efficient management of agricultural resources [1, 11]. It refines production methods from an administrative perspective and ensures effective crop marketing. [12] Conversely, the farming of various vegetables is incredibly important for some nations due to their export potential. [13] Vegetables play a crucial role in the national economy, primarily because they have a rapid growth cycle and produce high yields per area compared to other crops. Additionally, they offer quick financial returns and contribute to the growing number of food processing and packaging plants. Among the wide variety of vegetables, tomato represent approximately 60% of the total global production of fresh vegetables. [14] The tomato is a crucial horticultural crop in the human diet, ranking sixth among the most consumed crops globally [15] and the second most significant vegetable export after potatoes [16], In addition to its nutritional value, the high yield of tomato benefits struggling farmers, workers, and women in developing countries by helping to increase income and reduce inequality [17].

The Sulaymaniyah Governorate is a key area in the Kurdistan Region of Iraq for tomato production and marketing, while the region needs about 185,000 tons of tomatoes annually, local farmers produce only 55% of that amount, with the rest imported. [13] The decline in crop productivity can be attributed to several factors. Key issues include risks to productivity, such as land degradation caused by overuse in tomato cultivation, a shortage of quality tomato seeds, and marketing risks stemming from an imbalance between demand and supply in the tomato market. This situation is further exacerbated by substantial imports from neighboring countries. This highlights some shortcomings in the production and marketing processes within the governorate. Therefore, the motivation for this study is to address the following research questions:

1. What is the level of the role of agricultural extension centers in producing and marketing tomato in Sulaymaniyah Governorate?
2. What is the extent of variation between the independent variables (Age, Academic Specialization, Academic Achievement, Duration of agricultural extension service, and Training courses), and the role of agricultural extension centers in the production and marketing of tomato crops in Sulaymaniyah Governorate?
3. What are the problems that hinder the process of producing and marketing tomatoes in Sulaymaniyah Governorate from the point of view of agricultural extension workers?

**Research Objectives:**

1. Identify the role of agricultural extension centers in tomato production and marketing in Sulaymaniyah Governorate in general.
2. Determine the variance between the role of agricultural extension centers in tomato production and marketing and each of the variables (Age, Academic Specialization, Academic Achievement, Duration of agricultural extension service, and Training courses) in Sulaymaniyah Governorate.
3. Identifying the Problems facing the process of tomato production and marketing in Sulaymaniyah Governorate.

**Material And Methods**

**Research Methodology:** The research is categorized as exploratory and diagnostic, aligning with a descriptive approach that studies the phenomenon as it exists in reality. It aims to provide data and information regarding the role of agricultural extension centers in tomato production and marketing in the Sulaymaniyah Governorate of the Kurdistan Region of Iraq. [18]

**Research Area:** The area of the study was Sulaymaniyah Governorate due to the strategic agricultural regions. Known for its diverse agricultural activities, particularly in vegetable cultivation, with tomato being a major crop. The sector serves as a primary source of livelihood for a large portion of the local population, offering both economic support and food security.

**Research Population:** The research population consists of all workers in agricultural extension centers in Sulaymani Governorate, distributed among the districts and sub-districts, numbering 100 agricultural extension workers distributed among 12 extension centers. After excluding the pre-test sample of 16 respondents, the research population became 80 respondents, as shown in Table 1.

Table (1) Respondent distribution of in the Agricultural Guidance Directorate and its affiliated centers

| Governorate | Places | Population |
|---|---|---|
| Sulaimaniyah | Suleimani Center | 26 |
| | Dukan | 4 |
| | Darbanixan | 4 |
| | Bazyan | 3 |
| | Sharazwr | 8 |
| | Tanjaro | 5 |
| | Chwarta | 5 |
| | Chwarqwrna | 3 |
| | Qarahanjer | 12 |
| | Chamchamal | 7 |
| | Kalar | 5 |
| | Kfri | 2 |
| | Total | 84 |

**Data collection tool:**

A questionnaire was used to gather data from respondents. It effectively provides objective results, helping us achieve our research objectives. [19] To achieve the research objective questionnaire was designed which is consist of two sections. The first section focused on the personal information of the respondents, including age, academic specialization, academic achievement, duration of agricultural extension service, and training courses related to tomato cultivation. The second section of the questionnaire consisted of two key areas: The first axis includes 12 items related to the production and marketing process. Each item was presented to respondents, offering three alternative responses: agree, neutral, and disagree. These responses were assigned numerical values of 3, 2, and 1, respectively. The second axis aims to identify the problems faced in tomato production and marketing within the Sulaymaniyah Governorate. This section consists of 10 identified problems, evaluated using a four-point scale: very large, large, medium, small, and not a problem. The corresponding numerical values assigned to these responses are 5, 4, 3, 2 and 1.

To assess the face validity and content validity of the questionnaire, the researchers presented it to several professors specializing in agricultural extension and vegetables at the University of Sulaymaniyah. Based on feedback, modifications were made to certain items of the questionnaire. To assess the reliability of the scale, a preliminary test was conducted on a pilot sample of (16) agricultural extension workers from outside the main research sample. Cronbach's alpha coefficient was used as one of the standard statistical methods to measure the consistency of the research tool, where the value is considered acceptable when it reaches (0.70) or more [20, 21]. The reliability coefficient value reached (0.90) for the scale of the role of agricultural extension centers in tomato production and marketing, and (0.85) for the scale of problems facing the tomato production and marketing process, which reflects a high level of validity and reliability of the measurement tool. Data were collected through personal interviews. After collecting and organizing the data, the SPSS program was utilized, along with various statistical tools, to analyze the results. These tools included range, percentage, arithmetic mean, weight, standard deviation, ANOVA, and Cronbach's alpha.

**Result and Discussions**

**1. Identify the level of the role of agricultural extension centers in tomato production and marketing in Sulaymaniyah Governorate in general:**

The findings revealed that the highest value of agricultural extension centers role was (36) degrees, and the lowest value was (17) degrees, on the role scale with a theoretical range (12-36) degrees, with an arithmetic mean (31.84) and a standard deviation (4.16). The respondents were categorized into three levels regarding the role of agricultural extension centers, as illustrated in Table (2).

Table 2. Respondents distribution by agricultural extension centers role in tomato production and marketing

| Category | Frequency | % | Average of roles | $\overline{X}$ | Std. Deviation |
|---|---|---|---|---|---|
| Low (17 -23) | 3 | 3.57 | 19.33 | | |
| Medium (24-30) | 25 | 29.76 | 28.0 | 31.84 | 4.16 |
| High (more than 30) | 56 | 66.67 | 34.23 | | |

| | | |
|---|---|---|
| Total | 84 | 100 |

Table (2) indicates that the highest percentage of respondents is (66.67%), with an average score of (34.23) degrees in the High category (more than 30), while only 3.57% of the respondents represented the lowest percentage, with an average of (19.33) degrees in the Low category (17 -23). Most respondents in High roles tend to fall into the Medium category, however High and Medium categories constituted (96.43%) of the respondents, due to farmers' implementation of extension recommendations. This high rating reflects the efficiency of these centers in improving production quality, increasing marketed quantities, and supporting farmers in adopting modern agricultural and marketing practices. This result is consistent with the findings of the studies of [22, 23]

**1.1. Identify the level of the role of agricultural extension centers of tomato production in Sulaymaniyah Governorate:**

The data were observed, and the highest value of tomato production was (18) degrees, with the lowest value was (10) degrees, on the scale by a theoretical range (6-18) degrees, an arithmetic mean (16.54), and a standard deviation (1.98). The respondents were divided into three categories for the level of tomato production, as shown in Table (3).

Table 3. Distribution of respondents by agricultural extension centers role in tomato production

| Category | Frequency | % | Average of roles | $\overline{X}$ | Std. Deviation |
|---|---|---|---|---|---|
| Low (10 -12) | 6 | 7.14 | 11.33 | 16.54 | 1.98 |
| Medium (13-15) | 9 | 10.72 | 14.0 | | |
| High (16-18) | 69 | 82.14 | 17.32 | | |
| Total | 84 | 100 | | | |

Table (3) indicates the highest percentage of respondents is (82.14%), with an average score of (17.32) degrees in the High category (16-18), while the lowest percentage of the respondents was (7.14%), with an average of (11.33) degrees in the Low category (10 -12). It is clear from the results that the majority of the respondents who have High roles tend to Medium category, and that the High and Medium categories constituted (92.86%) of the total number of respondents, this may be attributed to a number of influential factors, most notably the success of these centers in transferring modern agricultural technologies to farmers, as well as the contributions of targeted guidance plans and continuous technical support. This result is consistent with the findings of the studies of [24, 25]

**1.2. Identify the role of agricultural extension centers in tomato marketing in Sulaymaniyah Governorate:**

The data reveals the agricultural extension role centers in tomato marketing based on the survey was (18) degrees, and the lowest value was (6) degrees, on the roles scale with a theoretical range (6-18) degrees, an arithmetic mean (15.31), and a standard deviation (2.72). The respondents were divided into three categories for the level of tomato marketing, as presented in Table (4).

Table 4. Distribution of respondents by agricultural extension centers role in tomato marketing

| Category | Frequency | % | Average of roles | $\overline{X}$ | Std. Deviation |
|---|---|---|---|---|---|
| Low (6 -10) | 3 | 3.57 | 7.67 | 15.31 | 2.72 |
| Medium (11-15) | 34 | 40.48 | 13.21 | | |
| High (more than 15) | 47 | 55.95 | 17.32 | | |
| Total | 84 | 100 | | | |

Table (4) indicate the highest percentage of respondents is (55.95%), with an average score of (17.32) degrees in the High category (more than 15), while only (3.57%) of the respondents represent the lowest percentage, with an average of (7.67) degrees in the Low category (6 -10), and that the High and Medium categories constituted (96.43%) of the respondents, due to the effectiveness of efforts to support farmers not only in production, but also in enabling them to access markets in more organized and profitable ways. This result is consistent with the findings of the studies of [23, 24]

**2. Determine the variance between the role of agricultural extension centers in tomato production and marketing and each of the variables (Age, Academic Specialization, Academic Achievement, Duration of agricultural extension service, and Training courses) in Sulaymaniyah Governorate.**

The findings indicated that respondents' ages ranged from (28-62) years, with an average age of 47.25 years. The respondents were divided into three age groups. The highest percentage of respondents (53.6%) referee to the age group of 39-49 years, while the lowest percentage (10.7%) is found in the 28-38 age groups. To explore the differences in the arithmetic means regarding the role of agricultural extension centers among different age groups, we conducted an analysis of variance (ANOVA). The calculated F-value was 0.092, which is lower than the tabled F-value at a significance level of 0.05. This indicates that agricultural extension workers from various age groups do not differ significantly in their opinions about the role of agricultural extension centers in tomato production and marketing in the Sulaymaniyah governorate, this result is consistent with the findings of the study of [23], as illustrated in Table (5).

According to the findings, the category with (Bachelors) achieved the most percentage (44%), while the group with High School obtained the lowest proportion (10.7%). ANOVA was conducted to compare the average roles of agricultural extension centers in tomato production and marketing based on academic achievement. An analysis of variance (ANOVA) assessed the perceptions of agricultural extension centers in tomato production and marketing across different academic achievement. The results indicated that the calculated F value was 1.068, which is lower than the tabular F value at a significance level of 0.05, thus indicated that agricultural extension workers have similar opinions regarding the role of agricultural extension centers in tomato production and marketing in the Sulaymaniyah governorate, this result is consistent with the findings of the study of [13], as shown in Table (5).

The research findings indicated that the duration of agricultural extension services for respondents ranged from 1 to 30 years, with an average of 15.82 years. The highest percentage of respondents, 60.7%, had 11 to 20 years of experience, while the lowest percentage, 15.5%, was in the 1 to 10 years range.

An analysis of variance was conducted to assess perceptions of agricultural extension centers in tomato production and marketing based on service duration. The calculated F value was 0.250, which is lower than the tabular F value at the 0.05 significance level. This indicates that agricultural extension workers, regardless of their experience, have similar opinions on the effectiveness of these centers in the Sulaymaniyah governorate, this result is consistent with the findings of the study of [26], as shown in Table 5.

The research found that 88.1% of respondents specialize in agricultural extension, with an average experience of 31.78 years. An analysis of variance (ANOVA) assessed the perceptions of agricultural extension centers in tomato production and marketing across different academic specializations. The calculated F-value was 0.134, significantly lower than the tabulated F-value at the 0.05 level. This suggests that agricultural extension workers, regardless of their academic backgrounds, have similar views on the role of these centers in tomato production and marketing in the Sulaymaniyah governorate.

The results of the research showed that (84.5%) of the respondent participate in training courses, with an average of (32.24) degrees, while the percentage of (15.5%) did not participated, with an average of (29.69) degrees, analysis of variance (F) was used, and its calculated value was 4.280 which is higher than the tabular (F) value at the level (0.05), This means that individuals who have received training may have a broader awareness and knowledge of the centers' capabilities and services than those who have not participated in these courses, which is reflected in their evaluation of the centers' performance.

Table (5): Distribution of respondents according to Independent variables

| Variables | Categories | F | % | Mean of total role | F-Value | Significance |
|---|---|---|---|---|---|---|
| Age | 28-38 | 9 | 10.7 | 31.78 | 0.092 | 0.912 |
| | 39-49 | 45 | 53.6 | 32.02 | | |
| | More than 50 | 30 | 35.7 | 31.60 | | |
| Academic achievement | High School | 9 | 10.7 | 32.0 | 1.068 | 0.367 |
| | Diploma | 26 | 31.0 | 31.46 | | |
| | Bachelors | 37 | 44.0 | 32.59 | | |
| | Postgraduate | 12 | 14.3 | 30.25 | | |
| Service duration | 1-10 | 13 | 15.5 | 31.15 | 0.250 | 0.780 |
| | 11-20 | 51 | 60.7 | 31.88 | | |
| | 21-30 | 20 | 23.8 | 32.20 | | |
| Academic specialization | Extension | 74 | 88.1 | 31.78 | 0.134 | 0.715 |
| | Non Extension | 10 | 11.9 | 32.30 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Participation of Training | participated | 71 | 84.5 | 32.24 | | |
| | Not participated | 13 | 15.5 | 29.69 | 4.280 | 0.042 |
| Total | | 84 | 100 | | | |

**3. Identifying the Problems facing the tomato production and marketing process in Sulaymaniyah Governorate.**

The challenges affecting tomato production and marketing in the Sulaymaniyah Governorate, as perceived by respondents, have weighted averages ranging from 3.04 to 4.40 and relative weights between 60.8% and 88.0%. These issues are ranked based on the number of respondents who indicated they are experiencing them, as detailed in Table (6).

Table. 6 Distribution of respondents according to problems related to the process of tomato production and marketing

| Problems | Ranks | weighted average | Percent weight |
|---|---|---|---|
| High costs of seeds, fertilizers, pesticides, and labor | 1 | 4.40 | 88.0 |
| Importing tomato from abroad | 2 | 4.31 | 86.2 |
| Lack of a local tomato processing factory | 3 | 4.27 | 85.4 |
| Low selling prices for tomato | 4 | 4.15 | 83.0 |
| Lack of cooling storage facilities for storing tomato | 5 | 4.11 | 82.2 |
| The lack of use of new technology by farmers | 6 | 3.83 | 76.6 |
| Infections, diseases, and pests affecting tomato crops | 7 | 3.73 | 74.6 |
| Lack of certified seeds for tomato production | 8 | 3.67 | 73.4 |
| Insufficient water for irrigation | 9 | 3.57 | 71.4 |
| Poor soil quality for tomato production | 10 | 3.04 | 60.8 |

Table (6) indicates that the problem (High costs of seeds, fertilizers, pesticides, and labor) ranks as the most significant problem, based on its importance and percentage weight. It received an average score of 4.40, translating to a percentage weight of 88.0%, which is higher than that of other problems. This result is consistent with the findings of the study of [13], this means that agricultural production costs are rising due to reliance on imported inputs, which are affected by fluctuations in exchange rates and shipping costs. This is in addition to weak government support and high seasonal labor wages, which increases the financial burden on farmers, while the problem (Poor soil quality for tomato production) ranked the lowest among various problems, according to importance and percentage weight, as it achieved an average of (3.04) degrees and a percentage weight of (60.8%), This is largely because most farmland is suitable for tomato, and farmers have improved the ability to address soil issues through fertilizers and modern techniques.

**Conclusion:**

In light of the research results, the following is concluded:

1. The role of agricultural extension centers in tomato production and marketing in the Sulaymaniyah governorate is generally high, we conclude from this that agricultural extension centers play an effective and noticeable role in supporting tomato production and marketing operations, which indicates the efficiency of their extension programs and their ability to meet farmers' needs and enhance agricultural value chains for this crop.
2. Opinions among respondents vary regarding the role of agricultural extension centers in tomato production and marketing in the Sulaymaniyah Governorate, particularly concerning participation in training courses. Due to differences in practical experience, actual exposure to agricultural extension content, and awareness of its role. Some believe that participating in training courses enhances a comprehensive understanding of the role of agricultural extension in production and marketing, while others believe that participation in training courses is often theoretical and does not include field visits or practical applications
3. According to the research variables (age, academic achievement, duration of agricultural extension service, and academic specialization) there is a consensus among the respondents regarding the role of agricultural extension centers in tomato production and marketing in Sulaymaniyah Governorate. This reflects a high level of agreement among farmers from different categories regarding their awareness of these practices.
4. The diversity and multiplicity of problems facing tomato production and marketing in Sulaymaniyah Governorate is evidence of the great need to pay attention to the role of agricultural extension centers by government agencies in

the region, especially the Ministry of Agriculture.

**Recommendations:**

1. Enhancing the role of agricultural extension centers requires increased attention from government agencies, particularly the Ministry of Agriculture in regional governments.
2. Providing ongoing training courses for agricultural extension workers on the latest agricultural production technologies, post-harvest management, and agricultural marketing.
3. Establishing specialized agricultural marketing departments within extension centers that are concerned with linking production to market demand.
4. Launching media awareness campaigns to inform farmers of the role of extension centers and the services available to them.

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# دور مراكز الإرشاد الزراعي في إنتاج وتسويق الطماطم في محافظة السليمانية بإقليم كردستان العراق

**سارا بورهان محمد[1]** **طاهر محمد لائق حسن [1]**
**جاوان محمد حمة صالح[1]** **كزان جمال حسن[1]**
[1]*قسم ادارة الاعمال المزرعية والتنمية , كلية هندسة العلوم الزراعية , جامعة السليمانية.*

الخلاصة

يهدف البحث بشكل رئيسي إلى التعرف على دور مراكز الإرشاد الزراعي في إنتاج وتسويق الطماطم في محافظة السليمانية، وكذلك تحديد التباين بين دور مراكز الإرشاد الزراعي في إنتاج وتسويق الطماطم وفقًا لبعض المتغيرات المتمثلة في (العمر، التخصص الدراسي، التحصيل الدراسي، مدة الخدمة الإرشادية الزراعية، والمشاركة في الدورات التدريبية)، بالإضافة إلى التعرف على المشكلات التي تواجه عملية إنتاج وتسويق الطماطم. شمل مجتمع البحث جميع المرشدين الزراعيين في مديرية الإرشاد الزراعي والمراكز التابعة لها في محافظة السليمانية والبالغ عددهم (100) مرشد زراعي. وبعد استبعاد (16) مستجيبًا منهم لإدراجهم في عينة المسح أصبح عدد المشمولين في عينة البحث (84) مستجيبًا يمثلون مجتمع البحث. وتسلط النتيجة الضوء على أن مستوى دور مراكز الإرشاد الزراعي في إنتاج وتسويق الطماطم مرتفع. أشارت النتائج إلى عدم وجود اختلاف في آراء المرشدين الزراعيين حول دور مراكز الإرشاد الزراعي في إنتاج وتسويق الطماطم تبعًا لمتغيرات البحث (العمر، التحصيل الدراسي، التخصص الدراسي، مدة الخدمة الإرشادية)، بينما لوحظت فروق بين متغير (المشاركة بالدورات التدريبية). كما أشارت نتائج البحث إلى وجود العديد من المشكلات التي تواجه عملية إنتاج وتسويق الطماطم، ومن أهمها ارتفاع تكاليف البذور والأسمدة والمبيدات والعمالة واستيراد الطماطم من الخارج، لذا اقترح الباحثون تدريب المرشدين الزراعيين وإطلاق حملات توعية إعلامية لتوعية المزارعين بمهام مراكز الإرشاد.

الكلمات المفتاحية: الزراعة ، الارشاد الزراعي ، المزارع ، الطماطة ، مركز الارشاد الزراعي.