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THE ROLE OF AGRICULTURAL EXTENSION WORKERS IN RAISING POTATO FARMERS' KNOWLEDGE OF POTATO PRODUCTION AND MARKETING

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ABSTRACT: Agricultural extension staff deliver farmers relevant and up-to-date market information, technical advice, and support on various agricultural production-related. The research objectives were to determine the role of agricultural extension workers in increasing potato farmers' knowledge regarding production and marketing to enhance their products, and it is based on some personal variables. Sulaymaniyah governorate was selected to conduct this research as a region. The research population included the extension workers in the agricultural extension directorate, the research sample included all extension workers which were (76 extension workers) in the targeted area. The data was collected through a questionnaire consisting of two parts. The findings show that the role of agricultural extension workers ranked as medium to high, it implies that they have a significant role in improving potato farmers' expertise in potato production and marketing to enhance their products. Additionally, there is a significant difference in the role of extension workers in raising potato farmers' knowledge of potato production according to these personal variables (age, level of education, gender, specialty, and communication methods). Similarly, there is a significant difference in the role of extension workers in raising potato farmers' knowledge of potato marketing according to these personal variables (age, level of education, gender, family status, specialty, and communication methods). To assist potato farmers, it was recommended that extension agents be given certain supplies and equipment, and provide training programs.

Key words: Agricultural extension, extension workers, knowledge, potato, farmers.

INTRODUCTION

In recent years, the agricultural industry has been experiencing an ever-increasing application of information and communication technologies globally, this new revolution has been touted to impact efficiency and productivity in the agricultural extension services within the agriculture sector **(Nyarko and Kozari, 2021)**. The activity of agricultural extension is a significant agricultural and political instrument of the state that stimulates the growth of agricultural production **(Qamar, 2005)**. Agricultural extension can play a crucial role in promoting agricultural productivity, increasing food security, and improving rural livelihoods. As one of their major functions, extension services are critical for moving research and technologies from the lab to the field, thereby translating new knowledge into innovative practices **(Niu and Rasaga, 2018)**. Moreover, it is the process of sharing knowledge, expertise, and technology from agricultural experts and researchers to farmers, which helps them adopt more efficient and sustainable practices. Besides, the agricultural extension is an educational process aimed at transmitting useful information to farmers and educating them to learn how to utilize the tools within their scope to solve their problems **(Al-Doski and Hamasalih, 2017)**. Additionally, this system is very crucial in the development of rural knowledge and innovative systems for farmers, which is key to informing

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and influencing rural household decisions **(Hamasalih and Mohammed, 2022)**. Agricultural extension activities include digital and on-site consulting, attending local and regional producer meetings, giving field day presentations, and carrying out experiments to improve agricultural practices. By participating in these activities, extension workers and farmers exchange information about how to improve production, increase crop diversity, provide nutrient support to soil, manage irrigation practices, and control pests and diseases. The extension agents have a vital role in technology transfer to the rural farmers, they optimize their best to persuade the farmers to adopt using technologies in their farming practice. Some of the obstacles to agricultural extension are related to the transfer of technology to farmers, it is necessary to identify them in some countries and the world as a whole and to build and develop strategies that can be applied to make agricultural extension more efficient and effective **(Hamasalih and Layeeq, 2023)**. Extension agents also play an important role in encouraging farmers to participate in project identification, planning, execution, and assessment, as well as supporting viable development programs, and their roles in agricultural technology transfer are raising awareness of extension agents' innovation, something new or perceived to be unknown to his clients, persuasion of the new technologies' usefulness or importance, reinforcement of continued use of the technology that has been formulated, and interest in continuing to practice the new idea that has been introduced through supporting services such as input, an intermediary between farmers and researchers **(AREMU *et al.*, 2015)**. Lack of information has long been recognized as one explanation for low adoption of agricultural technology that promotes productivity **(Conley and Udry, 2010; Levitt *et al.*, 2013; Micheels and Nolan, 2016)**, along with other explanations such as credit constraints, differences in preferences, differences in agroecological conditions, and spatially heterogeneous costs and benefits **(Duflo *et al.*, 2011; Suri, 2011; Chiyu and Ragasa, 2018)**. A multitude of approaches and modalities are available for delivering useful information to rural communities **(Chiyu and Ragasa, 2018)**. Potato is becoming recognized as an essential food security crop and as an economical alternative to costly grain imports **(Zh *et al.*, 2012)**. Compared to cereal farming, potato farming yields substantially higher-value crops per hectare, however, price and revenue variations are much more unpredictable for potato growers **(Vreugdenhil *et al.*, 2007)**. potato farmers may lack the necessary information to produce high-quality potatoes, such as proper soil and seed preparation, planting techniques, pest control, and post-harvest processes. As farmers need access to sufficient information to improve their products and sustainability **(Hamasalih and Layeeq, 2023)**. A large number of rural residents have moved to urban areas due to a lack of job opportunities, poor agricultural technologies, and marketing challenges. The majority of farmers have been affected by these five significant problems. Extension agents provide farmers with current information on potato cultivation, including best practices for pest and disease management, soil fertility, and irrigation. When faced with pest outbreaks or diseases, extension agents diagnose and recommend solutions to farmers while guiding them on preventive measures. When extension workers communicate with potato farmers, there can be obstacles that prevent effective collaboration and knowledge exchange. To overcome these challenges, a variety of strategies should be employed, such as selecting the appropriate communication channels, customizing messages to fit farmers' needs, involving local community leaders, utilizing participatory methods, and continually enhancing extension workers' communication and technical skills. Hence the idea of this study came to determine the role of agricultural extension in providing the necessary extension knowledge and skills to potato farmers in the fields of crop production and marketing and then to build plans and programs based on scientific foundations to increase production and quality of the potato crop in Sulaymaniyah Governorate in particular and the Kurdistan Region of Iraq in general. Therefore, this study is conducted as an attempt to answer the following questions:

1. What is the role of agricultural extension workers in increasing potato farmers' knowledge regarding the field of production and marketing to enhance their products?

2. What are the differences in the role of agricultural extension workers in increasing potato farmers' knowledge according to personal variables?

Objectives of the Research

1. Determine the role of agricultural extension workers in increasing potato farmers' knowledge regarding the field of production and marketing to enhance their products.
2. Describe the personal variables of the workers and identify the differences in the role of agricultural extension workers in increasing potato farmers' knowledge according to some variables.

MATERIALS AND METHODS

Research Methodology

To achieve the research objectives, a descriptive approach was used to obtain adequate and accurate information from social reality and contribute to analyzing its phenomena.

Research Area

This research was conducted in Sulaymaniyah governorate, Kurdistan Region of Iraq.

The Research Population and Sample Size

The research population included all agricultural extension workers in the Agricultural extension directorate in the center of Sulaymaniyah governorate they were (76 Extension workers), and all extension workers were selected as the research sample members (76 Extension workers).

Data Collection

The data were collected using a questionnaire, which consisted of two parts. The first part included a set of questions related to the personal characteristics of the respondents, such as (age, gender, academic achievement, extension service duration… etc.), and the second part was designed to determine the role of agricultural extension in raising the potato farmers' knowledge in production and marketing. The data were analyzed by Statistical Package for Social Science (SPSS version 25), and these statistical techniques were used (frequency, percentage, mean, standard deviation, t-test, and ANOVA).

RESULTS AND DISCUSSION

Determine the Role of Agricultural Extension Workers in Increasing Potato Farmers' Knowledge Regarding the Field of Production and Marketing to Enhance Their Products

To determine the total degree of the role of agricultural extension workers in the production field to enhance their products

The extension workers were classified into three levels depending on the actual range described in Table 1. It appears that 88.2% of the workers indicated that the total role of the agricultural extension tends from medium to high, these results indicate that the Agricultural extension is concerned with providing information and skills in producing potatoes as a strategic crop.

To determine the total degree of the role of agricultural extension workers in the field of marketing to enhance their products

The extension workers were classified into three levels depending on the actual range described in Table 2. It appears that 86.5% of the workers indicated that the total role of the agricultural extension tends from medium to high, Agricultural extension is concerned with providing information and skills in marketing the potato crop as an integral part after production.

Describe the Personal Variables of the Workers and Identify the Differences in the Role of Agricultural Extension Workers in Increasing Potato Farmers' Knowledge According to Some Variables

Production

Determine the differences in the role of agricultural extension workers in increasing potato farmers' knowledge in the field of production according to the different characteristics of the respondents.

Age

The findings in Table 3 show that the majority of the extension workers (%28.9) are within the age range of (42-46) years. The calculated

Table 1. Role of agricultural extension workers in the field of production

Levels of total role	Frequency	Percentage	Mean of Total role
Low (14 - 27) degree	9	11.8%	23.89
Medium (28 - 41) degree	12	15.8%	35.83
High (42 – 55) degree	55	72.4%	47.07
Total	**76**	**100%**	

Minimum=15 maximum=55 SD= 8.8 Mean= 42.55

Table 2. Role of agricultural extension workers in the field of marketing

Levels of total role	Frequency	Percentage	Mean of Total role
Low (7 - 13) degree	10	13.2%	7.20
Medium (14 - 20) degree	24	31.2%	17.38
High (21 – 27)	42	55.3%	24.21
Total	**76**	**100%**	

Minimum=14 maximum=27 SD= 6.14 Mean= 19.82

Table 3. Role of agricultural extension workers in increasing potato farmers' knowledge in the field of production based on some variables

Variables	Categories	Frequency	Percentage	Mean of total role	t-test F-value	Significance
Age/ years	**32-36**	9	11.8%	37.78	F 3.66	0.005**
	37-41	13	17.1%	37.62		
	42-46	22	28.9%	43.50		
	47-51	14	18.4%	48.64		
	52-56	9	11.8%	45.44		
	57-61	9	11.8%	39.78		
Level of Education	**Secondary**	8	10.5%	43.00	F 3.80	0.014*
	Diploma	12	15.8%	35.92		
	Bachelor's	50	65.8%	44.50		
	Postgraduate	6	7.9%	39.00		
Gender	**Male**	52	68.42%	44.25	t-test 2.56	0.012*
	Female	24	31.58%	38.88		
Family status	**Unmarried**	5	6.58%	36.40	t-test 1.63	0.10
	Married	71	93.42%	42.99		N.S
Service/	**7-16**	26	34.2%	40.77	F 1.56	0.21
years	**17-26**	36	47.4%	44.42		N.S
	27-36	14	18.4%	41.07		
Specialty	**Horticulture**	10	13.2%	46.10	F4.21	0.000**
	Animal	12	15.8%	45.17		
	Food	7	9.2%	46.00		
	Machinery	3	3.9%	40.00		
	Field Crop	20	26.3%	40.00		
	Protection	6	7.9%	31.17		
	Extension	8	10.5%	40.63		
	Economic	1	1.3%	28.00		
	Soil	9	11.8%	49.89		
Communication	**Training**	27	35.5%	45.44	F 2.93	0.026*
methods	**Visit**	25	32.9%	40.88		
	Tel	4	5.3%	44.25		
	Network	8	10.5%	34.75		
	workplace	12	15.8%	44.17		

F-value (3.66) is more than the table value, which means there is a significant difference in the role of extension workers in production according to age. This means that age affects the role of agricultural extension workers in increasing potato farmers' knowledge in the field of production, this may be due to the category of (42-46) years of the workers taking more responsibilities compared to other groups, and this category has reached maturity in activity and experience.

Education

The results in Table 3 show that the majority of the extension workers (65.8%) in the studied area are university graduates. The calculated F-value (3.80) is more than the table value, this means there is a significant difference in their total role in the production field according to their education levels, which means A deeper comprehension of scientific concepts, agricultural technologies, and agricultural processes is frequently correlated with higher educational attainment. Advanced-educated extension agents are better able to understand and explain intricate agricultural ideas to farmers, resulting in more efficient information transfer.

Gender

The results of Table 3 show most of the workers are male (68.42%). Since the calculated t-test (2.56), is more than the table value, this means that there is a significant difference in their total role in the production field according to gender. The reason is the intricate interaction of gender dynamics, cultural norms, and programmatic considerations within agricultural extension services is shown in the strong association between the gender of extension workers and their involvement in enhancing farmers' knowledge in production.

Family status

The results show that most extension workers belong to the married category. The calculated t-test is (1.63), which is less than the table value, this means that there is no significant difference in the total role of extension workers in increasing potato farmers' knowledge in production according to the family status. Maybe the reason is a person's family situation may affect their personal life, but it is typically not seen to affect their ability to perform as extension workers professionally.

Service duration

Depending on the obtained results, most extension workers are within the medium category of service duration (17–26) years. As shown in Table 3, the calculated F-value (1.56) is less than the table value. This suggests that there is no significant difference in the Total role of extension workers in increasing potato farmers' knowledge of production according to the service duration of the trainees. Maybe this is because more significant than their duration of service is the extension worker's capacity to adjust to evolving farming methods, technological advancements, and farmer demands.

Specialty

Table 3 shows that the majority of the specialties (%26.3) are field crops. The calculated F-value (4.21) is more than the table value. This means that there is a significant difference in the role of extension workers in the production field according to the specialty. Maybe the reason is field crop extension agents are highly skilled and knowledgeable about several aspects of crop production, such as crop selection, planting strategies, managing pests and diseases, irrigation, soil fertility, and harvesting practices.

Communication methods

It appears from the results that most of the workers (35.5% are using the training methods to communicate. The calculated F- value is (2.93), which is more than the table value, this means that there is a significant difference in the role of production according to the communication methods. May the reason the communication channels selected affect how easily farmers can obtain extension services, extension agents can reach a wider audience of farmers, especially those in distant or underserved areas, by using a range of communication methods, including in-person meetings, mobile phones, radio broadcasts, printed materials, and digital platforms.

Marketing

Determine the differences in the role of agricultural extension workers in increasing potato farmers' knowledge in the field of marketing according to the different characteristics of the respondents.

Age

The findings in Table 4 show that the majority of the extension workers (% 28.9) are within the age range of (42-46) years. The calculated F-value (3.52) is more than the table value. This means that there is a significant difference in the role of extension workers in increasing potato farmers' knowledge in the field of marketing according to age. This means that age is affecting the role of extension workers increasing potato farmers' knowledge in the field of marketing, this may be due to the category of (42-46) years of workers taking more responsibilities compared to other groups, and this category has reached maturity in activity and experience.

Education

The results showed that the majority of the extension workers (65.8%) in the studied area are university graduates. The calculated F- value (4.33) is more than the table value. This means there is a significant difference in the total role of agricultural extension workers in increasing potato farmers' knowledge in the field of marketing according to education levels. Maybe the reason is that highly educated agricultural extension agents are frequently more knowledgeable about market characteristics, such as pricing trends, customer preferences, market channels, and marketing tactics.

Gender

The findings in Table 4 show that most of the workers are male (68.42%). Since the calculated t-test (2.77), is more than the table value, it means there is a significant difference in the total role of agricultural extension workers in increasing potato farmers' knowledge in the field of marketing according to gender. The reason is men may be more active in agricultural decision-making and commercial activities, such as marketing, in many nations due to conventional gender roles and customs, because of this, both male and female farmers may view male extension workers as more reliable or knowledgeable sources of information on matters about marketing.

Family status

According to the findings most extension workers belong to the married category. The calculated t-test is (2.16), which is more than the table value, this means there is a significant difference in the role of marketing according to the family status. Maybe the reason is that married extension workers with family may possess a stronger comprehension of family dynamics, decision-making procedures inside the home, and the interplay between the roles and duties of family members, therefor this knowledge can help them when they interact with farmers so that marketing plans and recommendations fit the priorities and needs of the whole family.

Service duration

Depending on the obtained results, most of the workers are within the medium category of service duration (17–26) years. As shown in Table 4, the calculated F-value (1.12) is less than the table value. This suggests that there is no significant difference in the total role of agricultural extension workers in increasing potato farmers' knowledge in the field of marketing according to the service duration of the extension workers. Maybe because a variety of factors, including customer tastes, market trends, and economic situations, make agricultural markets dynamic and always changing. Extension agents need to stay current on these developments, no matter how long they have been in the field, to give farmers accurate and pertinent information. Therefore, as long as extension workers can adjust to changing market dynamics, their tenure may not have a substantial impact on how well they increase farmers' marketing expertise.

Specialty

The results in Table 4 show that the majority of extension workers' specialties (%26.3) are field crops. The calculated F-value (6.07) is more than the table value. This means that there is a significant difference in the role of extension workers in the field of marketing according to the specialty. Maybe the reason is field crop specialists are knowledgeable about the particular needs of the market, quality benchmarks, and customer preferences related to various field crops. Farmers' understanding of market dynamics and requirements can be increased by their advice on how to produce crops that satisfy market demand in terms of quality, quantity, and timeliness.

Table 4. Role of agricultural extension workers in increasing potato farmers' knowledge in the field of marketing based on some variables

Variables	Categories	Frequency	Percentage	Mean of total role	t-test F-value	Significance
Age/ years	**32-36**	9	11.8%	15.44	F 3.52	0.007**
	37-41	13	17.1%	17.08		
	42-46	22	28.9%	20.36		
	47-51	14	18.4%	24.21		
	52-56	9	11.8%	21.00		
	57-61	9	11.8%	18.78		
Level of Education	**Secondary**	8	10.5%	20.62	F 4.33	0.007**
	Diploma	12	15.8%	15.00		
	Bachelor's	50	65.8%	21.20		
	Postgraduate	6	7.9%	16.83		
Gender	**Male**	52	68.42%	21.23	t-test 2.77	0.009**
	Female	24	31.58%	16.75		
family status	**Unmarried**	5		14.20	t-test 2.16	0.033*
	Married	71		20.21		
Service/years	**7-16**	26	34.2%	18.69	F 1.12	0.33
	17-26	36	47.4%	20.92		N.S
	27-36	14	18.4%	19.07		
Specialty	**Horticulture**	10	13.2%	22.30	F 6.07	0.000**
	Animal	12	15.8%	21.75		
	food	7	9.2%	23.43		
	Machinery	3	3.9%	16.67		
	Field Crop	20	26.3%	17.20		
	Protection	6	7.9%	11.33		
	Extension	8	10.5%	18.50		
	Economic	1	1.3%	14.00		
	Soil	9	11.8%	26.00		
Communication methods	**Training**	27	35.5%	22.19	F 4.13	0.005**
	Visit	25	32.9%	18.04		
	Tel	4	5.3%	20.75		
	Network	8	10.5%	14.12		
	work place	12	15.8%	21.67		

Communication methods

The results illustrate that most of the workers (35.5%) are using training methods to communicate. The calculated F-value is (4.13), which is more than the table value, this means that there is a significant difference in the role of extension workers in the field of marketing according to communication methods. Maybe the reason is farmers can engage in interactive learning using training communication techniques like seminars, workshops, and field demonstrations, by allowing farmers to ask questions, exchange stories, and take part in practical activities about marketing techniques, these approaches actively involve farmers in the learning process.

Conclusion and Recommendation

Overall, the role of agricultural extension workers ranked as medium to high, noting that they have a significant role in improving their expertise to enhance potato production and marketing in the targeted area. The potato crop has great importance to farmers, and it is considered a strategic crop in the agricultural sector and important for investment. Additionally, there is a significant difference in the role of extension workers according to these personal variables (Age, level of education, gender, specialty, and communication methods) in increasing potato farmers' knowledge of production. Similarly, there is a significant difference in the role of extension workers according to these personal variables and the role that extension workers play in marketing (Age, level of education, gender, family status, specialty, and communication methods). To assist potato farmers, it was recommended that extension workers should be given certain supplies and equipment, and provide training programs that are adapted to the unique requirements and difficulties that farmers encounter in various geographic areas, many facets of contemporary farming methods, such as soil health, pest management, crop management, and sustainable farming methods, ought to be covered in these programs.

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دور العاملين بالإرشاد الزراعي في رفع مستوى معرفة مزارعي البطاطا في إنتاج وتسويق البطاطا

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كلية العلوم الهندسة الزراعية – جامعة السليمانية – العراق

يقوم العاملين في الإرشاد الزراعي بتزويد المزارعين بالمعلومات عن الاسواق الحديثة ذات الصلة بالزراعة مع المشورة الفنية والدعم في مختلف المجالات المتعلقة بالإنتاج الزراعي. استهدف البحث إلى تحديد دور العاملين الإرشاد الزراعي في زيادة معارف مزارعي البطاطا فيما يتعلق بالإنتاج والتسويق لتعزيز و زيادة منتجاتهم، وذلك اعتماداً على بعض المتغيرات الشخصية لهم. تم اختيار محافظة السليمانية لإجراء هذا البحث كنطاق للبحث. شمل مجتمع البحث جميع المرشدين الزراعيين في مديرية الإرشاد الزراعي، وتضمنت عينة البحث جميع المرشدين الزراعيين والبالغ عددهم (76 مرشداً). تم جمع البيانات من خلال استمارة استبيان ويتكون من جزأين. أظهرت النتائج أن دور العاملين الإرشاد الزراعي متوسط يميل إلى الارتفاع، مما يعني أن لديهم دورفي تحسين خبرة مزارعي البطاطا في ناحية الإنتاج والتسويق لتعزيز منتجاتهم ، اضافة إلى ذلك هناك فروقات معنوية في دور العاملين الإرشاد الزراعي في رفع معارف مزارعي البطاطا في مجال إنتاج البطاطا باختلاف المتغيرات التالية (العمر، المستوى التعليمي، الجنس، التخصص، وطرق الاتصال). كذلك هناك فروقات معنوية كبير في دور المرشدين في رفع مستوى معرفة مزارعي البطاطا في مجال تسويق البطاطا باختلاف المتغيرات التالية (العمر، المستوى التعليمي، الجنس، الحالة العائلية، التخصص، وطرق الاتصال). ومن اجل مساعدة مزارعي البطاطا، يوصي البحث بتزويد العاملين الإرشاد الزراعي بالمعدات والمستلزمات الفنية المساعدة لتزويد المزارعين بالمعلومات الفنية الحديثة و كذلك توفير برامج تدريبية لهم في مجال انتاج و تسويق البطاطا بالطرق الحديثة .

الكلمات الإسترشادية: الإرشاد الزراعي، المرشدين الزراعيين، المعرفة، البطاطس، المزارعين.