Knowledge Needs of Vegetable Growers in Managing Protected Agriculture Technology in Nineveh Governorate".

Anhar M.A. Hasan1* Abdul Alaziz.H.Midhass1 Ali M. Jassim1
1Department of Agricultural Extension and Technology Transfer/College of Agriculture and Forestry
/University of Mosul, Iraq.
*Corresponding author: anhar2007@uomosul.edu.iq

Abstract

The aim of the study was to identify the knowledge needs of vegetable crop farmers in managing agricultural technologies in the protected area in each of the following areas: the field of establishing and designing greenhouses, the field of growing and serving vegetables in greenhouses, and the field of controlling environmental factors within the protected area. The second objective was to identify whether there are significant correlations between the dependent variable and the studied independent variables such as (age, number of greenhouses, educational attainment, and type of cultivated crops). The research population was (235) farmers who own greenhouses in Nineveh Governorate. A simple random sample was drawn from them at a rate of (29%), meaning the final sample was (68) respondents. Data were collected using a questionnaire. The results of the study indicated that there is a moderate need for information related to protected agriculture. The study also indicated in the results that there is a significant correlation at the probability level ($P \leq 0.05$) between the knowledge needs and each of the independent variables (number of greenhouses and type of cultivated crops). The study highlighted several recommendations, the most important of which are: conducting training courses for farmers to enhance their knowledge in crop cultivation and greenhouse management, and distributing guidance brochures to farmers to develop their knowledge of managing protected agriculture technique

Key words: Farmers,knowledge needs, protected agriculture, vegetable crops,Nineveh Governorate.

Introduction and research problem

Agricultural extension plays an active role in development of hydroponics (1).The protected agriculture is a system of growing crops inside protected structures such as greenhouses. These are modern techniques such as artificial lighting, temperature control, moisture retention, and provision of plant nutrients to increase crop growth.This technology is considered very useful in areas with harsh climates and limited spaces. It increases crop productivity and reduces dependence on natural resources such as soil and water (2).Protected agriculture is called indoor agriculture and it aims to improve agricultural productivity and improve the growth environment for plants by covering the farms and protecting them from harsh weather conditions with a transparent cover made of transparent plastic or glass.Some modern methods can be used to attract thermal energy (3).We can control the temperature, humidity, light, and air purity inside the farm and to increase of Plant growth period, crop productivity, product quality and reduces

ISSN 2072-3857

disease incidence (4).In addition, protected agriculture helps protect the agricultural environment by reducing the use of pesticides and chemical fertilizers which leads to less pollution and improved quality of agricultural products and helps create a sustainable environment for subsequent generations.

The technology used in protected agriculture includes many systems (5) which are as follows:

.1Environmental control system: This system uses sensors to measure temperature, humidity and air quality within the farm's internal environment which enables it to control environmental factors, reduce agricultural waste and save electricity.

.2Lighting: Artificial lamps are used to stabilize the heat and thus improving growth and increasing farm productivity.

.3Nutrition system: This technology is used to provide the necessary nutrients to plants within irrigation water, neutralize harmful elements and filter the used water.

.4Irrigation system:This system uses technologies to reduce water consumption to protect the environment and save the planet such as a micro-drip system for irrigation.

.5Robots and drones: Robots and drones are used to monitor and analyze agricultural soils, identify problem areas that require additional care and are also used to harvest agricultural commodities.

In addition , there are many types of technology was used in protected agriculture (6) which are as follows:

.1Smart irrigation systems: Sensors and automatic control are used to determine the water needs of plants and provide it efficiently.As a result, the concept of using these techniques to collect the forage crops like clover (7.(

.2Environmental control systems: Sensors are used to determine the level of temperature, humidity, and carbon dioxide in the environment surrounding plants and automatically adjust them to provide optimal conditions for plant growth.

.3Disease and pest monitoring systems: Cameras and sensors are used to monitor and analyze potential diseases and pests in crops, warn farmers and take preventive measures (8.(

.4Hydroponics: Techniques are used that allow plants to be grown in water instead of traditional soil, which reduces water and fertilizer consumption

.5Agricultural robots: Autonomous robots and machines are used for farming, harvesting, inspecting and cleaning fields automatically and with high efficiency.

In addition, there are many types of technology used in protected agriculture (6) which are as follows:

.1Smart irrigation systems: Sensors and automatic control are used to determine the water needs of plants and provide it efficiently. As a result, the concept of using of these methods for some forage crops such as clover (7.(

.2Environmental control systems: Sensors are used to determine the level of temperature, humidity, and carbon dioxide in the environment surrounding plants, and automatically adjust them to provide optimal conditions for plant growth.

.3Disease and pest monitoring systems: Cameras and sensors are used to monitor and analyze potential diseases and pests in crops, warn farmers and take preventive measures (8.(

.4Hydroponics: Techniques are used that allow plants to be grown in water instead of

ISSN 2072-3857

traditional soil, which reduces water and fertilizer consumption

.5Agricultural robots: Autonomous robots and machines are used for farming, harvesting, inspecting, and cleaning fields automatically and with high efficiency.

Some approaches employed in protected agriculture take into account environmental challenges and to some resistant for climate swings (9) which help increase farm productivity, improve resource use efficiency, and reduce environmental pollution. Among the crops grown in the greenhouse system are tomatoes, cucumbers, lettuce, peppers, basil, parsley, thyme, strawberries, eggplant, green beans, and radishes (10). Protected agriculture: This involves providing services to greenhouse growers, identifying their needs in protected areas, and creating an environment that protects plants from adverse weather conditions and pests. It also helps produce high-quality fresh vegetables year-round. Given the importance of this topic, it was necessary to provide guidance and direction to growers in the field of greenhouse vegetable crops. This was achieved by identifying their needs and providing them with relevant information and knowledge through training courses and informational bulletins provided by agricultural extension workers. (11).It was the responsibility of agricultural guidance through agricultural extension research was responsibility to identify farmers' needs for knowledge and information related to the management of vegetable cultivation technology in greenhouses and through the knowledge gap in field of technology management related to vegetable cultivation in greenhouses. This is considered a problem that must be solved through this study by answering the following research questions-:

.1 What are the cognitive needs of some vegetable crops growers in the protected agriculture technology management in Nineveh Governorate in general?

.2 What are the cognitive needs of some vegetable crops growers in the protected agriculture technology management in Nineveh Governorate in each of the following study areas (field of establishing and designing greenhouses, field of growing vegetables and serving in greenhouses, field of controlling environmental factors inside greenhouses?(

.3 What is the correlation between the dependent variable (cognitive needs) and the independent variables (age, educational level, number of greenhouses, type of crops grown.(

Research objectives:

.1To identify the cognitive needs of some vegetable crops farmers in management of protected agriculture technology in Nineveh Governorate in general.

.2To identify the cognitive needs of some vegetable crops farmers in management of protected agriculture technology in Nineveh Governorate in each of the following study fields (field of establishing and designing greenhouses, field of growing vegetables and serving them in greenhouses, field of controlling environmental factors inside greenhouses.(

.3Determining the relationship between the dependent and independent factors which include number of greenhouses, age, educational attainment and type of crops grown.(

The research importance:

The importance of greenhouses lies in fact that they provide a high-return economy for vegetable crop farmers and provide them with large areas of agricultural land to grow important vegetable crops. Moreover, to

ISSN 2072-3857

diversity of crops grown in them and protecting them from the cold of winter and heat of summer, thus finally returning a large economic return for farmers and the country as a whole.

Research hypotheses:

.1There is no significant correlation between cognitive needs and the age variable.

.2There is no significant correlation between cognitive needs and the variable of educational level.

.3There is no significant correlation between cognitive needs and the variable of the number of greenhouses.

.4There is no substantial relationship between cognitive needs and sort of crops farmed.

Materials and methods:

The descriptive strategy was utilized in current study because the research data are descriptive and faithful to reality that needs to be investigated and reality is accurately depicted Sometimes the survey method is used (13.(

Research area:

The study area was focused on Nineveh Governorate, which has a large number of agricultural workers engaged in agricultural extension.

The Research community and sample:

This study included all growers who owned protected dwellings which totaled 235 farmers.

A simple random sample was selected at a rate of 29% and so this sample size reached 68 respondents which was distributed throughout the governorate.

Data collection tool-:

Part One: Independent factors: It includes some personal characteristics of the respondents, which are (age,educational level,number of greenhouses,type of crops grown).The following was measured-:

.1Age:Each year's score was used to calculate the age.

.2Educational attainment: It was assessed using substitutes (by given score (1) for illiterate and given number (2) for Reads and writes and given number (3) for primary stage and given number (4) for intermediate and given number (5) for Preparatory and given number (6) for College.

.3Number of greenhouses: by giving score for each house.

.4Type of crops grown: by giving a symbol for each crop such as (1) for eggplant, (2)for tomato , (3) for cucumbers , (4) for pepper and (5) for each other crop (5.(

Part Two:The cognitive requirements of vegetable farmers are the dependent variable in Nineveh Governorate. This variable included (37) paragraphs distributed over three fields which namely (field of establishing and designing greenhouses, field of growing vegetables and serving them in greenhouses, field of controlling environmental factors inside greenhouses). At a rate of (12, 13, 12) paragraphs for each field respectively, and they were measured by using a tetra scale that includes some following alternatives:

)a).big need, a medium need, a little need, I do not need) and the alternatives were given numerical values (1, 2, 3, 4) were assigned to each of the choices respectively.

Validity and reliability:

.1Validity: refers to how well scale fulfills intended functions and goals for which it was created (13) which inorder to verify the apparent validity and to ensure the validity of the paragraphs in their initial form, so they were presented to professionals and authorities in the domains of agricultural advisory in the Department of Agricultural Guidance in the College of Agriculture and Forestry at the University of Mosul, and they received the approval of the arbitrators at a rate of (85%), which indicates their suitability to measure what they were designed for the experts' suggestions were taken into account regarding some amendments.So the number became Paragraphs (73) paragraphs and therefore the survey was prepared to gather firsthand information.

.2Stability: It denotes outcomes if the scale is applied again to the same set of people after 15-day interval (14).To find stability, a random survey sample (test-pre) was selected with a size of (30) farms that were excluded when selecting the research sample whose goal was to guarantee that questionnaire form's questions were understandable.To find the stability coefficient for the scale paragraphs and its validity, the Cronbach's alpha coefficient was used because it gives the minimum estimated value for the stability coefficient (15) and Determining the correlation between each paragraph's variation and overall variance which is necessary to determine the Cronbach's alpha value. According to (16) a value of the stability coefficient of 0.80 or higher is deemed appropriate and signifies the stability of the scale. and if it is more than (0.70), it is considered acceptable (17).The value of the stability coefficient for the dependent variable of the current research reached (91%), and thus tool is considered stable and acceptable.

Data Collection.

After the questionnaire form was ready to collect data, it was distributed on (68) respondents which other than the initial sample of (30 respondents.(

Statistical Methods:

After completing data collection, the data were verified, transcribed, and organized into tables using the Excel program in accordance with the study objectives. The Statistical Package for the Social Sciences (SPSS) versions 18, 19, and 20 were then utilized to evaluate the data

Results and Discussion

.1First objective : to identifying the cognitive needs of some vegetable crops farmers in the management of protected agriculture technology in Nineveh Governorate in general.

The findings demonstrated that on a scale whose theoretical value was between (37-148), farmers' real cognitive needs ranged from (40-145) with an average of (117) and a standard deviation of 13.13.The respondents were divided according to the actual scale into three categories using the range, as shown in table (1.(

Table 1.Shows the respondents distribution which according to degree of the knowledge requirements of vegetable growers in general.

Categories	Number	Percentage (%)
Low (40-74)	8	11.8
Medium (75-109)	21	30.9
High (110-145)	39	57.3
Total	68	100

$\bar{X}$=117 s.d.=13.3 .

The results of this study (table 1) shows that highest proportion of responders fell into the high category, accounting for 57.3 percent of all respondents and followed the medium category at (30.9%). Therefore, the level of knowledge needs of vegetable farmers in general was high and perhaps the reason for this is that farmers have modest information in field of protected agriculture.

Second objective: To identify the knowledge needs of farmers of some vegetable crops in management of protected agriculture technology in Nineveh Governorate for each of the following study fields (field of establishing and designing protected houses, field of growing vegetables and serving them in protected houses, field of controlling environmental factors inside protected houses.(

The first field: The field of establishing and designing greenhouses.

This results showed that the degree of farmers' cognitive needs ranged between (10-45) with an arithmetic mean of (26.5) standard deviation of (5.46), on a theoretical scale with values ranging from 12 to 48.The range shown in table (2) was used to categorize the respondents into three groups.

Table 2 shows the respondents' distribution based on the level of knowledge required for vegetable growers to create and design protected houses.

Categories	Number	Percentage (%)
Low (40-74)	8	11.8
Medium (75-109)	21	30.9
High (110-145)	39	57.3
Total	68	100

$\bar{X}$=26.5 s.d.=5.46.

Table (2) makes it evident that the largest proportion of respondents, or 58.8% of the total, were in the high category, followed by the medium category, or 26.5% of the respondents.Therefore, the degree of knowledge requirements of vegetable growers in field of establishing and designing greenhouses was high and perhaps the reason for it is that the respondents which need more experience in field of designing and establishing greenhouses.

The second field: The field of vegetable cultivation and its service in greenhouses.

According to the findings, on a scale with a theoretical value between (13-52) farmers' cognitive needs varied between (9–44) with an average of (25) and a standard deviation of (8.5).The range shown in table (3) was used to categorize the respondents into three groups.

Table 3.The respondents distribution to according to degree of knowledge needs of vegetable growers in field of vegetable cultivation and its service in protected houses.

Categories	Number	Percentage (%)
Low (9-20)	9	13.23
Medium (21-32)	23	33.84
High (33- and above)	36	52.93
Total	68	100%

$\bar{X}$=25 s.d.=8.5.

ISSN 2072-3857

The results, as shown in Table 3, show that 52.93% of farmers were in the high category, while 33.84% were in the medium category. Therefore, the degree of knowledge need in this area is considered high, perhaps due to the scarcity of information received by respondents regarding vegetable cultivation and greenhouse services.

Third field: The field of controlling environmental factors inside greenhouses.

The result of the research was that the scores for this field were between (12-41) with an average of (21) with a standard deviation of (6.3) on a scale whose scores were between (12-48). The sample members were divided into three categories using the range as shown in table (4.(

Table 4. Shows the respondents distribution according to the degree of knowledge needs of vegetable growers in field of controlling environmental factors inside greenhouses.

Categories	Number	Percentage (%)
Low (12-19)	21	30.8
Medium (20-29)	11	16.1
High(30-41)	36	53.1
Totaal 68	68	100

X=21 s.d.=6.3.

Through the results from table (4) it makes it evident that the largest proportion of respondents was 53.1% of the total in the high category, while the lowest number which (30.8%) was belonged to the low category.Therefore, the degree of knowledge needs of vegetable growers in field of controlling environmental factors inside greenhouses is described as high tending to decrease and perhaps the reason for it's that the respondents' knowledge in field of controlling environmental factors was very little inside greenhouses and there were no updates in their old knowledge.

.3The third objective:The goal is to determine the relationship between the dependent variable (cognitive needs)and an independent variables which included exposure to information sources, age, educational attainment, number of greenhouses, crop type, and years of greenhouse experience.

.1Age: The respondents were split up into three groups and as table (5) illustrates the middle group had the greatest participation rate at 46%.

Table 5. Distribution of respondents according to age.

Categories	Number	(%)	(r).	Sig	∞
Low (25-35).	17	25	0.084	0.323	0.05
Medium (36-46).	25	36.76			
High (47-58).	26	38.24			
Total	68	100%			

It was found that the highest percentage of the respondents was in the (middle) category with a percentage of (24.38), and to know the relationship between the degree of cognitive needs and the age variable, Pearson's simple correlation coefficient was used, which amounted to (0.084) and the significance level (sig.) to extract the correlation relationship through the value of (sig.) which was not significant at this level, as it amounted to (0.323), which is greater than the significance value (0.05). Based on this, we accept the statistical hypothesis that indicates that age is not related to participation in decision-making.

.2Educational level: The respondents were distributed according to the range into eight levels and the highest percentage was at the primary level where their percentage reached (37%) as shown in table (6.(

Table 6. Distribution of Respondents by Educational Level.

Categories	**Number**	**(%)**	R	Sig	∞
Illiterate	13	19.2	0.097	0.473	0.05
Reads and Writes	12	17.65			
Primary	20	29.4			
Intermediate	10	14.7			
Preparatory	9	13.2			
College	2	2.9			
Total	68	100%			

The table above shows that the highest educational qualification for the respondents was primary school, with a percentage of (29.4), The value was insignificant at the 0.05 level, reaching 0.473, which is higher than the significance level, indicating that it is not significant at the 0.05 probability level. Therefore, we agree with the null hypothesis, perhaps because cognitive needs are not related to certifications in the greenhouse field.

.3Number of plastic houses:The responders were split up into three groups with having the largest percentage is the high category (more than 10 years) and its percentage reached (55.8%) as shown in table (7.(

Table 7. Distribution of respondents according to Number of plastic houses

.

Categories	**Number**	**(%)**	(r).	Sig	∞
Less than5 Years	10	14.7	0.344	0.032	0.05
5-10 years	20	29.4			
More than 10 years	38	55.8			
Total	68	100٪			

The table above shows that the highest percentage of respondents were in the (More than 10 years) category, with a percentage of (55.8). To find the relationship between the degree of cognitive needs and the variable of the number of greenhouses, Pearson's correlation coefficient was used, which reached (0.173), and the (Sig) value (0.032), which is less than the probability value (0.05). It was used to verify the significance of the correlation, and as a result, it is statistically significant at the probability level (0.05). We support the research hypothesis that confirms the existence of a significant correlation between the two variables, and we reject the statistical hypothesis. This may be attributed to the fact that those who own more homes are more in need of information.

Table 8. Type of crop grown.

Categories	**Number**	**(%)**	(r).	Sig	∞
Eggplant	10	14.7	0.647	0.029	0.05
Tomato	22	32.4			
Cucumber	18	26.5			
Pepper	15	22			
Other Crops	3	4.4			
Total	68	100%			

The table above shows that the highest percentage of needs were for tomato farmers (32.4%). In order to find the relationship between the dependent variable, which is the knowledge need, and the quantitative variable (type of cultivated crops), Spearman's rank correlation coefficient was used, with a value of (0.147). When verifying the significance of the relationship through the probability value (sig) of (0.029), it was less than the standard value (0.05), and therefore it is significant at this level. Therefore, we reject the statistical hypothesis that states (there is no significant correlation between the dependent variable and the crop type variable) and accept the alternative hypothesis, which states (there is a statistically significant relationship between the two variables). This is due to the fact that the majority of farmers grow tomatoes in greenhouses and are most in need of knowledge related to greenhouses, as it is their most productive crop.

Conclusions-;

.1The cognitive needs of farmers of some vegetable crops in management of protected agriculture technology were large for Nineveh Governorate in general and the explanation can be attributed to farmers' ignorance and lack of information in this study.

.2The degree of identification of the cognitive needs of some vegetable crops farmers in management of protected agriculture technology was high in all areas and the reason may be due to lack of knowledge and information of farmers in all areas in Nineveh Governorate.

.3The study showed a positive and significant correlation between each of variables of the number of plastic houses and the type of crop grown and degree of cognitive needs of vegetable farmers in management of protected agriculture technology in Nineveh Governorate. We conclude from this study that more number of houses owned by farmer.The more his need for knowledge in the field of study and also with the diversity of number of crops grown his need for learning and knowledge increases more in management of the technology of growing vegetable crops in protected houses.

Recommendations

.1Launch training courses in greenhouse crop management techniques .

ISSN 2072-3857

.2Provide farmers with information and knowledge related to greenhouse crop management .

.3Provide greenhouses by the Ministry of Agriculture to farmers to raise their economic level .

.4Distribute greenhouse management guidebooks to farmers in Nineveh Governorate .

.5Conduct further studies on the cultivation of other crops in other regions to disseminate their benefits.

.6The need to provide farmers with relevant information and knowledge regarding the management of crops grown in protected environments.

Conflict of interest: The authors declare that there is no conflict of interest.

Acknowledgments: All authors would like to thank the Department of Agricultural Extension and Technology Transfer and Deanship of the College of Agriculture and Forestry , University of Mosul/Iraq for their support and assistance to the researchers and overcoming research obstacles which encouraged to completion of the research requirements.Also, we extend their deep gratitude to the vegetable farmers in Nineveh Governorate/Iraq for their cooperation in providing us with guidance and technical information in filling out the questionnaire form that paved for us to conduct this study.

References

.1M'Sadeq, S.A., Omer, F.A., Abdullah, H.M., Mohammed, N.I., Mizzouri, N. S., Russell M. J., Dickson, A.J., and Hirst, P.M. (2023). The reality of agricultural extension activities in the nineveh plain region post libaration, Mesopotamia Journal of Agriculture.51(3),22-36. https://magrj.mosuljournals.com/article_180618.html.

.2Ahmed,G.A.and Elsisi,A.A.(2020).Efficacy of Compost and Some Essential Oils Alone or in Combination in Controlling Cucumber White Mould Disease Under Protected House Conditions.Journal of Plant Protection and Pathology;Vol.11(6):291-297.Mansoura University,Egypt. https://www.jppp.journals.ekb.eg/article_103284.html

.3Idumah, F.O. and Awe, F. (2023). Determinants of rural households'energy consumption in egbeda local government area of oyo state: a multinomial approach. Mesopotamia Journal of Agriculture, 51(1),79-91. http://dx.doi.org/10.33899/magrj.2023.137633.1213

.4Nasser, Sahar S., Adel H. Bahnasawy, Taha H. Ashour and El-Sayed G. Khater.(2021).Utilization of solar energy in greenhouse heating during winter season in Egypt, MISR JOURNAL OF AGRICULTURAL ENGINEERING;38 (2): 181 – 194. https://mjae.journals.ekb.eg/

.5Al-Alaf, Ahmed.2021.The effect of mixing some specialized pesticides with calcium and boron in controlling gray mold disease caused by the fungus Botrytis cinerea on tomatoes in greenhouses. Tishreen University Journal-Biological Sciences Series;43(6),171-182. https://search.emarefa.net/ar/detail/BIM-1426410

.6Kalhori,2015.The knowledge level of greenhouse farmers regarding agricultural extension recommendations for cucumber crops in Sulaymaniyah Governorate and related factors. Journal of Agricultural Economics and Social Sciences;6(9),1373-1381. https://search.mandumah.com/Record/1228616

.7Resol.A.H.S. and Sultan. K.H.(2023).Influence of feeding panicum mombasa and alfalfa grass on carcass traits of arabi lambs Mesopotamia Journal of Agriculture,51(3),37- 45. https://www.iasj.net/iasj/download/533554375325c16a

.8Al-Tawani, Rahab Mohamed Arabi, and Aida Abdullah Abdel Wahab, Abdel Hakim Omar Hussein Al-Faqih Ashraf Yaqoub Sweidan.2022.The effect of different levels of fertilizer injected with pressure differential fertilizer on the growth and productivity of pepper strains in greenhouses. African Journal of Advanced Pure and Applied Sciences (AJAPAS),197-208. https://aaasjournals.com/index.php/ajapas/article/view/272/253

.9Alsinayi, M., Aldosky, A.A., and Alabbassi, A. F. (2022). Attitude of rural women towards some environmental issues in duhok governorate, kurdistan region of iraq.Mesopotamia Journal of Agriculture, 50(4),1-9. https://10.0.132.107/magrj.2022.1

.10Ibrahim,Ali Ahmed and Ghanem Sami.2023. Economic evaluation of agricultural nursery projects in greenhouses: A case study of a nursery for seedlings of the most important types of vegetables in Sharkia Governorate.Zagazig Journal of Agricultural Research, 50(6),979-998. http://nile.enal.sci.eg/cgi-bin/koha/opac-detail.pl?biblionumber=69137

.11Al-Tanoubi,Mohammad Mohammad Omar.(1998).Agricultural Guidance Reference,First Edition, National Library House, Benghazi, Republic of Arabian Libya.https://books.google.com › about Google books

.12Cameron, S.J., Sheng, J., Hosseinian, F., and Willmore, W.G. (2022). Nanoparticle effects on stress response pathways and nanoparticle–protein, Mesopotamia Journal of Agriculture, Vol. 52, No. 1, 2024 (1-16) 15.https://doi.org/10.3390/ijms23147962

.13Mikhail, Amtanius.2006.Measurement and evaluation in modern education. University of Damascus Publications, Syria.https://www.noor-book.com/

.14Areifj,Sami and Khalid Musleh.1999. Measurement and Evaluation. Fourth Edition, Majdalawi Printing and Publishing House, Amman,Jordan. http://libsys.qattanfoundation.org:320/records/index/1/2309

.15Al-Nabhan, Musa, 2004. Basics of Measurement in Behavioral Sciences. First Edition, p. (451-456). Dar Al-Shorouk for Publishing and Distribution, Amman - Jordan. http://192.116.4.4/WebOPAC/records/1/79790.aspx

.16Allam, Salah El-Din Mahmoud.2023.Diagnostic and Educational Measurements, Dar Al-Masirah for Distribution and Publishing, Amman ,Jordan. https://www.neelwafurat.com/itempage.aspx?id=lbb152019-113512&search=books

.17Murad, Salah Ahmed and Amin Ali Suleiman.2002.Tests and measures in psychological and educational sciences, steps for preparing them and their characteristics, first edition, Dar Al-Kitab Al-Hadith, Kuwait. https://www.zaid-alwan3204.com/2021/01/blog-post_7.html#google_vignette

.18Al-Baldawi,Abdul Hameed Abdul Majeed.2009.Statistical Methods for Economic Sciences and Business Administration by Using the SPSS Program,Particial and Multi-Level Correlation Coefficient. First Edition, pp.(197-204). Wael Publishing and Distribution House, Amman, Jordan.https://academiaglobe.com › pdf_book › 210351

.19Al-Hiti, Salah Al-Din Hussein.2006.Statistical Methods in Management Sciences Applications by Using SPSS,2nd edition,Wael Publishing and Distribution House.Amman, Jordan. http://libserver.bethlehem.edu/webopac/records/1/84898.aspx

.20Al-Ansari,A.I. and Hasan A.M.A.2021.The Role of Extension Farms in Developing the Knowledge,Skills and Attitudes of Farmers in the Provinces of Central Iraq. IOP Conf. Series:Earth and Environmental Science 761,012135.doi:10.1088/1755-1315/761/1/012135.