



RESEARCH ARTICLE

Attitudes of Agricultural Extension Workers towards the use of artificial intelligence in the extension systems in Sulaymaniyah Governorate.

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Received: 04/09/2024	Revised: 10/10/2024	Accepted: 16/10/2024	Published: 01/12/2024
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ABSTRACT

The research aims to identify the attitudes of agricultural extension workers towards using artificial intelligence in the Extension System in Sulaiymaniyah governorate and determine the degree of benefit of agriculture from smart technology sources and the correlation between them. The community research included all agricultural extension workers which numbered 297 workers, they were selected from the community by 33%, and they became the number 99 workers in the study area. Then the researcher used the questionnaire for data collection which included two parts, the first one related to independent variables and the second related to the Attitudes of agricultural extension workers towards the use of (AI) in the extension system that consists 20 Items which measured by classifying the respondents into three categories and gave the estimated weights for each category respectively, the form was ready for data collection. Finally, the researcher adopted the statically methods (Frequent, Percentage, Stander division, and Arithmetic means) as well as used SPSS version18 software in its analysis.

The results showed that the majority of respondents ' attitudes towards the use of (AI) was natural degree tends to negative, while the result showed a correlation between the degree of usefulness of the respondents from smart technology sources and their Attitudes, and the source of the smartphone ranked first in terms of use, which left a positive impact among other smart technology sources as well as the application of GIS came in last ranked In terms of Use and influence on the attitudes of respondents, As for the independent variables, the results showed a significant correlation between the respondents ' attitudes toward using (AI) and the following variables: age, living status, number of hours worked, and participation in training courses. While there is no correlation between the directions of the respondents and the variables: gender and specialization. So, the research concluded that the average Agricultural Extension Worker's attitude towards the use of (AI) tends slightly to the negative, which indicates that their performance and information in this field are below the required level, as well as the degree to which respondents benefit from the sources of smart technologies and their uses in the field of extension work and its systems.

Keywords: Attitudes, Agricultural extension workers, Artificial Intelligence (AI), Extension Systems, smart technology sources..

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INTRODUCTION

The world has witnessed fundamental changes in recent years on the level of the world economy 'this is due to the emergence of several forces and changes, perhaps the most important of which is globalization and the world that has become a small village as a result of the massive and accelerated development of technology, which has become a source of intense competition between countries, organizations, and individuals [1]. The human person is also considered the main factor in achieving progress and development in the economic and social fields, and It contributes to driving innovation and entrepreneurship, so, to increase the productivity of the human factor, they must be given desirable behavioral changes, represented by knowledge, acquiring skills (performance and intellectual) and changing their views, feelings, and attitudes [2], as well as Behavioral change is critical to effective digital adoption, as it goes beyond the mere use of technology [3]. According to Al-Qahtani, the term artificial intelligence refers to systems or devices that mimic human intelligence to perform tasks and that can improve themselves based on the information they collect [4]. And, Artificial intelligence (AI) is considered one of the most important inventions of the modern era in the world of technology, and it has a role in improving the performance of human resources and their management. All studies emphasized the role of (AI) in human resources operations related to training, qualification and employment, as well as its role in improving human resources performance, increasing achievement rates, speed and avoiding mistakes [5,6,7, 8 and 9].

Other studies indicated that (AI) employees can take tests based on their abilities, skills, and learning level, and they can enhance educational experiences for learners and their promotion [10]. It can Additionally, the Chat-GPT application helps

employees in many areas, including content writing and customer service also be used to track and diagnose problems in the fields of Agriculture [11].

Agricultural extension, the future of Agricultural Extension and education is closely linked to modern technical developments, and in this framework, the progress in artificial intelligence has new possibilities and challenges for the provision of extension services and activities, which leads it to enhance the levels of effectiveness of extension activities to farmers and thus increase the efficiency and effectiveness of the extension institution [12].

Despite the positive role of (AI), studies indicate that the use of artificial intelligence applications in the field of management and Extension systems leads to the automation of many educational activities and replacing the role of extension workers in many professional roles and tasks, and the use of this application can affect the tendencies of workers in their professional role and integration while performing tasks and jobs [13]. So, one of the most important studies that point to the limitations of AI and its uses is the Goto study [14]. which indicates that the increasing use of AI applications is likely to be harmful to professions and jobs. As well as the study of Al-Dawood [15], Indicates that the lack of many workers of modern technical skills and the absence of material and moral motivation to use modern technologies at work. In the light of the previous obstacles, it shows that the positive trends of an individual determine how successful he is in his life on a professional and personal level 'especially positive attitudes towards work will push the individual to overcome and overcome the obstacles that hinder the performance of this work [16,17]. Due to the limited field research in the Kurdistan region, which dealt with attitudes of agricultural extension workers so, the problem of the current research can be formulated in the following question: What are Attitudes of Agricultural Extension Workers towards the use of artificial intelligence in the extension systems in Sulaymaniyah Governorate?

Research objectives:

- 1. To Identifying attitudes of agricultural extension workers towards the use of artificial intelligence in the extension systems in Sulaymaniyah Governorate
- 2. To determining the degree of benefit of agricultural extension workers from smart technology sources
- 3. To determining the relationship between the attitudes of agricultural extension workers towards the use of (AI) in the extension systems within benefit of agricultural extension workers from smart technology sources.
- 4. To determining the relationship between the attitudes of agricultural extension workers towards the use of (AI) by adopting extension systems and the following Variables: Age, Gender, Specialization, Living situation, Number of working hours, and Participation in training courses.

Materials and Methods

Research Methodology: The descriptive type of research, which deals with attitudes in the context of the scientific description of the methodological document of reality, describes multiple components, and The search for survey methods was also used in the study area of agricultural extension workers in Sulaymaniyah governorate, and Use the research in the questionnaire form as a research tool to study the field and explore their opinions and attitudes.

Research area:

The research area included the district center and all the districts where the departments and the Agricultural Extension Division are located.

Community and research sample:

The community research included all agricultural extension workers which numbered 297 workers, they were selected from the community by 33%, and they became the number 99 workers in the study area.

Preparation research tool, Validity and Reliability

Preparation of research tools: To achieve the research objective, the questionnaire form was prepared in the light of the researcher's knowledge of the relevant literature and review some studies on the subject of research with consulting specialists in agricultural extension and specialists in the fields of media and information technology transfer at Sulaimani University. The form consists of three parts, which are as follows:

First: this part includes independent variables: age, gender, specialty, living status, number of working hours, and participation in training courses, The variables mentioned were measured as follows:

Age: was measured by the number of years of age of the researcher and was divided into age groups

Gender: Was classified into (Female) and (Male), and the estimated weights were given (1, 2) respectively.

Specialty: this variable was measured by classifying the respondents according to the study sections into two categories: Management and agricultural extension, the other agricultural specialties, and the estimated weights are given to them (2, 1) respectively

Living status: was measured by classification into three categories: High, Medium, Low and was given estimated weights (1, 2, 3) respectively

Number of working hours: it is measured by the number of hours spent or used by artificial intelligence researchers and its applications, and it was divided into four categories: 5, 6, 7 and 8 hours per day.

Participation in the training courses is measured by the participation of the researcher in the training during the service or not, and they were classified into two categories (Yes, No), and the estimated weights were given(1, 2) respectively.

Second: It concerns the formulation of questions related to identifying the attitudes of agricultural extension workers toward the use of AI in extension systems, which consists of 20 Items. They will be distributed to 10 positive items and 10 negative items. As well as for measuring the attitudes paragraphs used a Likert-type scale, as Katherine and Kimberly 2017, point to the Likert scale as a technique used to measure attitudes [18], To measure the variable of the researchers ' attitude toward the use of artificial intelligence in the extension system, they were classified into three categories, namely (Positive, Normal, Negative) and the estimated weights were given (1, 2, 3) respectively.

Third: this part concerns the degree of utilization of smart technology resources which consists of (7) sources of smart technology and includes: Smartphone applications, research, and follow-up of the agricultural situation, Geographic Information Systems (GIS), the use of smart computers, social networks, participation, and remote training, and to find out the degree of utilization for respondents the Likert triad scale was used and consisted of graduated levels (High, Neutral, law). And to measure the numerical values given as follows (3, 2,1).so, the total values were between (7-21) degrees for the factor making use of smart technology sources.

After the formulation of the research tool, the validity and Reliability operations were performed, Validity is the ability of an instrument to measure what it is designed to measure [19]. In order to check the honesty, the researcher informed several specialists in information technology and agricultural extension at the University of Sulaymaniyah. Then, All the phrases of the items were agreed upon, So, the form was ready for the Pre-test, Then the pre-testing process was carried out on 20 extensional workers outside the survey sample in the German-Department of Sulaymaniyah governorate.

In addition, the reliability coefficient was used to determine the correctness of the user's test in the search and to check the accuracy of the content and the conformity of its attributes. It is a necessary condition for Validity. [20] and Reliability is the extent to which test scores are consistent [21]. As well as to find out the degree of reliability, the method of half-segmentation was used to measure stability using the Pearson equation whose value was 0.79, And corrected for the scale as a whole using the Spearman-Brown equation as its value reached 0.85. This calculated value is acceptable according to many statistical sources [22], and the validity was extracted where it reached %92. The form was characterized by high reliability. So, reliability is considered satisfactory and acceptable if its value reaches 0.70 or more [23,24 and 25].

In light of this result, the questionnaire form is ready to collect the final data, and the data was collected from the selected sample on April 25, 2024. After collecting and tabulating the data, statistical tools (Frequency, Percentage, Standard deviation, and Arithmetic mean) were used, and the SPSS Version 18 Software was used to analyse the data and to find the results of the current search [26].

Results and Discussion:

First: Identify attitudes of agricultural extension workers towards the use of artificial intelligence in the extension systems in Sulaymaniyah Governorate

The respondents' scores were obtained the highest value was 49 degrees, the lowest was 23 degrees, and the arithmetic mean was 35.51 degrees, then the respondents ' scores were converted from Raw to standard using the Z-Scale Then the attitude scores were divided into three categories: positive-neutral-negative, as shown in Table1:

Table (1) Distribution of resp	ondents according	to their attit	tudes towards the use of A	I in general
Attitudes' Categories	Frequencies	%	Arithmetic means	Notes
Negative: 23-31	35	35.35	27.61	$X^{-} = 35.51$
Natural : 32-40	37	37.38	36.78	
Positive: 41-49	27	27.27	34.00	S.D= 6.96
Total	99	100		

In Table 1, the results showed that the respondents 'attitudes towards the use of AI tend to be negative, representing 72.73 % for the neutral and negative categories and 27.27% for the positive level. The reason may be that the use of artificial intelligence in the field of extension management needs an application of the acquired knowledge by agricultural extension workers and they are not at the required level in employing this technique to organize extension activities during the practice of their work in the study area

2. Determining the degree of benefit of agricultural extension workers from smart technology sources and its relationship with their attitudes of agricultural extension workers towards the use of AI in the extension systems in Sulaymaniyah Governorate The respondents were given the highest score for exposure to smart technology sources, which is 21 degrees, and the lowest is 7 degrees, with an arithmetic mean of 12.15 degrees, then the respondents ' scores were converted from Raw to standard using Z-criteria Then the attitude scores were divided into three categories: law-neutral-high as shown in Table 2

Table (2) Distribution of respondents related to the extent of utilization of smart technology sources according to attitudes

Categories of Benefit of Sources	Frequencies	%	Arithmetic means	Notes
Law: 7-11	45	45.00	46.16	$X^{-} = 35.51$
Natural : 12-16	46	46.00	44.52	S.D= 6.96
High : 17-21	8	9	47.50	Correlation Coefficient = 0.024
Total	99	100		

In Table 2, The results showed that the majority of benefits to smart technology sources are rather negative, and They represent 92% of the total respondents located in natural and negative categories and 8.1 % of respondents Located within the positive categories. To find out if there is a relationship between the variable of the respondents 'exposure to information sources and the trend variable, the T-test was used, and its calculated value was (0.024), which is less than its Tabular value (1.96). And the relationship is not significant. The reason may be because the majority of workers rely heavily on smartphones for social communication and the use of other applications, without knowing about the importance of artificial intelligence applications in organizing extension activities.

In addition, to determine which of the technological sources were available most of the time and the most useful for the respondents. These sources are arranged based on the relative importance of sources for smart technology. In Table (2-1), the result showed that the source of smartphone applications got to the first rank with a percentage of 62.62%. So, this result is because the majority of extension workers own smartphones and use applications related to social communication in their free time at their workplace, without taking advantage of applications related to extension work. As for the least useful source of GIS, which got the last ranking, it may be because this source is used sparingly in extension work or the extension worker didn't have any information about this source in terms of utilization and use in extension work.

Table (2-1) The ranking of smart technology sources used by respondents

No.	Sources	Frequencies	%	Ranking
1	Smartphone applications	62	62.60	- 1
2	Social media networks	53	53.51	2
3	Interview and participation	21	21.21	4
4	Monitoring the agricultural situation	18	18.18	5
5	GIS Geographic Information Systems	3	3	7
6	Smart and pneumatic computer	41	41.41	3
7	Distance training	11	11.11	6

3. Determining the relationship between the attitudes of agricultural extension workers towards the use of AI by adopting extension systems and the following Variables:.

In Table (3), the result showed that the independent variables of the research sample are as follows: age: the result showed that 73.75% of the respondents located within (22 - 47) years. So, whenever it is Respondents are young by age 'whenever it is the attitude of respondents towards the use of artificial intelligence in agricultural extension systems is great, and this is an increase in the propensity to use artificial intelligence resulting from the respondents owning smartphones and its applications, despite its expensive cost from the economic side as well as It is noted in the gender that the majority of respondents are males and constitute 76.76% of the total respondents. The reason may be due to the lack of opportunity to participate in the interviews to do field guidance work and benefit from the application of frontier communication technology, especially artificial intelligence in the organization of business and administrative and technical tasks related to the practice of their work in the field compared to their male peers in the study area. As for the living situation, it is noted that 83.84% of respondents have an income level or their living situation located into the middle and low categories. So, whenever it is Respondents ' living conditions are low whenever it is Their trends towards the use of artificial intelligence are few this affects the purchasing power and their possession of smart technologies used in the field of extension management as well as according to the variable number of working hours, the result showed that the majority of respondents work between six and seven hours a day, accounting for 62.60% of the total respondents. the reason may be due to the fact that whenever it is Respondents spend more hours with artificial intelligence apps owhenever it is their attitude towards use of these applications is positive, which pushes them to develop their cognitive and skill abilities in the areas of management and organization of extension activities. And, It is noted in the specialties that 58.58% of the respondents are located within other agricultural specialties. This result can be attributed to the respondents who graduated from other agricultural departments have a negative attitude towards the use of artificial intelligence compared to their other peers as a result of the fact that the majority of them carry out administrative practices within extension department and have fewer opportunities to use information sources on the application of artificial intelligence in organizing extension activities. Finally, it is noted in the variable of participation in training courses, the result showed that 69.70% of respondents did not participate in any training courses. The reason may be due to Respondents who did not participate in training courses are the most likely to benefit from artificial intelligence and

use its applications, So, this is due to their reliance on self-education and taking advantage of study topics while using artificial intelligence while in their daily work place. In addition, In Table (3) The result shows that there is a correlation between the variables: Age, Living status, Hours of work, and Participation in training courses, while there is no significant relationship in the Attitudes according to two variables: Gender and specialization.

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Female 23 23.24 44.87 - 0.056 None. Sig Livelihood level : Livelihood level : Livelihood level : Significant Medium 49 49.49 43.00 0.825 Significant High 16 16.16 37.19 0.825 Significant
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Hours of work :
Five 19 19 20 37 68
Six 31 3130 42.68 Significant
Seven 31 3130 4874 0.760 $0.01 (**)$
Fight 18 18 20 53 06
Type of Specialization:
Extension and
Management 41 41.42 46.20
Other -0.843 None Sig
agricultural 58 5858 4502
specialties
Participate in Training courses:
Participated 30 30 30 43 20 Significant
Not Participated $69 6970 4651 0.219 0.05(*)$
Total 99 100

Conclusions:

1. The research concluded that the average Agricultural Extension Worker's attitude towards the use of (AI) tends slightly to the negative, which indicates that their performance and information in this field are below the required level

- The negative attitudes of agricultural extension workers towards the use of artificial intelligence in extension systems 2. are changing directly with the limited sources of smart technology and making use of them, but depends on other factors such as scientific experience, providing a communication environment, providing a computer and the internet in their workplaces and the complexity of the uses of this application by agricultural extension workers.
- The result shows a significant correlation between age and attitudes (it is concluded that the change in years of age will 3. affect the degrees of respondents ' attitudes negatively towards the use and adoption of innovations in the field of extension management.
- The extension department gives more administrative tasks within the department to females compared to males, which 4. negatively affects the attitudes and acquired knowledge of employees towards using AI applications and adopting them in their field of extension work.
- 5. There is a significant relationship between the attitudes and the living situation. we conclude that improving the living situation of the respondents will positively change their attitudes towards the use of AI in their field of extension work, and with regard to participation in training courses, we conclude that participation in training courses will change the attitudes of respondents towards gaining the amount of knowledge of artificial intelligence and adopting it in guidance work in the study area.
- The result showed that there is a significant relationship between working hours and respondents ' attitudes, and We 6. conclude from this that the more working hours the respondents have, the more they are positively inclined towards using Smart technology, as they have communication networks at their workplace throughout the official working hours inside and outside the Agricultural Extension Department in the study area.

Recommendations:

- 1. The research recommended opening training courses and small projects by the ministries of higher education and agriculture on these unique innovations and integrating them with the Agricultural Extension System in the KRI.
- 2. The necessity of dispatching agricultural extension workers to neighboring countries by the Ministry of Agriculture in order to participate in international conferences benefit from the expertise of AI specialists and improve the performance of extension institutions and agricultural extension workers in the KRI.

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اتجاهات العاملين بالارشاد الزراعي نحو استخدام الذكاء الاصطناعي في أنظمة الإرشاد بمحافظة التجاهات العاملين بالارشاد الزراعي نحو اسليمانية

دارا عبدالرحمن صالح

قسم ادارة اعمال الزراعية والتنمية الريفية ، كلية هندسة للعلوم الزراعية ، جامعة السليمانية ،العراق

الخلاصة :

يهدف البحث إلى التعرف على اتجاهات العاملين بالارشاد الزراعي نحواستخدام الذكاء الاصطناعي في نظام الإرشاد الزراعي في محافظات السليمانية ، وتحديد مدى الاستفادة من مصادر التكنولوجيا الذكية و ايجاد العلاقة بين اتجاهات و مدى الاستفادة من المصادر المعلوماتية ، و شملت مجتمع البحث جميع العاملين الارشاديين في مديرية الارشاد الزراعي والذين بلغ عددهم 297 عاملا ، وتم اختيارهم من المجتمع بنسبة 33٪ ، وأصبحوا 99 عاملا في منطقة الدراسة. ثم استخدم الباحث استمارة الاستيان لجمع البيانات و الذي يتكون من جزأين ، جزء الأول يتعلق بالمتغيرات المستقلة والثانية يتعلق باتحاهات العاملين بالارشاد ثم استخدم الباحث استمارة الاستيان لجمع البيانات و الذي يتكون من جزأين ، جزء الأول يتعلق بالمتغيرات المستقلة والثانية يتعلق باتجاهات العاملين بالارشاد الزراعي نحواستخدام الذكاء الاصطناعي والذي يتكون من 20 فقرات وتم قياسها بتصنيف المستجيبين إلى ثلاث فئات وأعطى الأوزان التقديرية لكل فئة على التوالي وبذلك اصبحت الاستبانة جاهزة لجمع البيانات ، وأخيرا اعتمد الباحث على ادوات الاحصائية لتحليل البيانات وهي : التحرينية الانرساد متورسط الحسابي)، وكذلك استخدم برنامج كالالارها و 11 عن الواحث على ادوات الاحصائية لتحليل البيانات وهي : الانحراف القياسي ، متوسط الحسابي)، وكذلك استخدم برنامج كالاتكار الاصدار 18 في تحليله.

وأظهرت النتائج أن غالبية المستجيبين اتجاهاتهم نحو استخدام الذكاء الاصطناعي كانت درجة طبيعية تميل إلى السلبية ، في حين أظهرت النتيجة بوجود العلاقة الارتباطية بين درجة فائدة المستجيبين من مصادر التكنولوجيا الذكية واتجاهاتهم ،واظهرت النتيجة بان مصدر الهاتف الذكي جاءت في المرتبة الأولى من حيث الاستخدام ، مما ترك أثرا إيجابيا بين مصادر التكنولوجيا الذكية واتجاهاتهم ،واظهرت النتيجة بان مصدر الهاتف الذكي جاءت في المرتبة الأولى من حيث المستجيبين .كما أظهرت النتائج بوجود العلاقة معنوية بين اتجاهات المستجيبين نحواستخدام الذكاء الاصطناعي والمتغيرات الاتية: العمر ، والحالة المعيشية ، المستجيبين .كما أظهرت النتائج بوجود العلاقة معنوية بين اتجاهات المستجيبين نحواستخدام الذكاء الاصطناعي والمتغيرات الاتية: العمر ، والحالة المعيشية ، عدد ساعات العمل ، والمشاركة في الدورات التدريبية، بينما لا توجد العلاقة بين اتجاهات المستجيبين والمتغيرات الاتية: العمر ، ولذلك يستنتج البحث إلى أن اتجاهات العمل ، والمشاركة في الدورات التدريبية، بينما لا توجد العلاقة بين اتجاهات المستجيبين والمتغيرات الاتية: العمر ، والحالة المعيشية ، ولى أن اتجاهات العمل موالد التخريبية، بينما لا توجد العلاقة بين اتجاهات المستجيبين والمتغيرات الاتية: العمر ، والحالة المعيشية ال ولى أن اتجاهات العمل موالم الذراعي متوسط يميل قليلا إلى السلبية ، مما يشير إلى أن أدائهم ومعلوماتهم في هذا المجال أقل من المستوى المطوب ، وكذلك درجة استفادة المستجيبين من مصادر التقنيات الذكية واستخداماتها في ادارة النظم والعمل الارشادي في منطقة الدراسة .

الكلمات المفتاحية : الاتجاهات ، العاملين بالارشاد الزراعي ، الذكاء الاصطناعي (Al) ، نظم الارشاد، التقنيات الذكية.