Determinants of using the modern irrigation methods by farmers in Namrod District/ Nineveh Governorate

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Abstract

The research aimed to identify the determinants of the use of modern irrigation methods by the farmers of Namrod Sub-district / Nineveh Governorate in general, to rank the items of the determinants of the use of modern irrigation methods by the farmers of Namrod Sub-district, and to identify the correlation relationship between the determinants of the use of modern irrigation methods by the farmers of Namrod Sub-district / Nineveh Governorate and the following independent variables (educational qualification, number of years of experience, farm holding, type of ownership, participation in training courses in the field of modern irrigation methods, and sources of information in the field of modern irrigation methods).
The research population included all farmers in Namrod Sub-district, whose number was (500) farmers. A simple random sample was selected at a rate of (20%), and thus the research sample amounted to (100) respondents. Data were collected by means of a questionnaire form that included two parts. The first part included the independent research variables, while the second part included the dependent variable, which was measured using four-point measurement alternatives consisting of (27) items to measure the determinants of the use of modern irrigation methods by the farmers of Namrod Sub-district / Nineveh Governorate. The questionnaire was then presented to specialized experts in the Department of Agricultural Extension and the Department of Soil Sciences and Water Resources. The face validity of the questionnaire was obtained, and its reliability coefficient was calculated using Cronbach's alpha method. For data analysis, the arithmetic mean and chi-square were used by means of the SPSS program. The results showed that (57%) of the farmers have a high level of awareness of the determinants of the use of modern irrigation methods, and these determinants are characterized as having an effect on farmers' use of modern irrigation methods. It was also found that there is a statistically significant correlation between the determinants of the use of modern irrigation methods and the variables (educational qualification, participation in training courses in the field of modern irrigation methods, and sources of information in the field of modern irrigation methods). Meanwhile, there is no statistically significant correlation between the determinants of the use of modern irrigation methods and the variables (number of years of experience, farm holding, and type of ownership). The research also included a number of conclusions and recommendations.
Keywords: irrigation, modern, methods, using, Determinants.

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Introduction

Water is considered one of the most important elements of life on planet Earth, and this has made it a basic need of utmost importance throughout the ages for all nations and peoples, **And this is confirmed by the Holy Qur'an in His saying: "And We made from water every living thing.** "Often the names of ancient civilizations were associated with certain water sites, such as the Nile Valley civilization, the Mesopotamian civilization, the Hadramaut civilization, and others. This was and still is a direct result of man's awareness since the beginning of creation of the necessity of water for his survival and for the prosperity and development of states [1]. Therefore, irrigation is considered the largest consumer of fresh water in the world, estimated at about 70% of the water used annually to produce 30–40% of the world's food crops on 17% of agricultural lands. And concern for **fresh water** has become more important and more necessary than before. Good water management has become an inevitable necessity to ensure the optimal use of the available quantity of water, in a way that does not affect the natural environment [2]. Water plays a major and important role in the agricultural development process, there can be no agricultural development without water. This means that achieving sustainable agricultural development depends on the use of water resources, which are considered the main source for agriculture and the achievement of food security. According to World Bank estimates, water levels are expected to decline by 2035, thereby reducing the per capita share of water [3]. which has led to the increasing need to expand agricultural areas and increase agricultural production in order to meet the food needs of the increasing numbers of people, which is matched by a shortage of water resources in the world, and to move toward all methods that can reduce water losses and increase water use efficiency and exploit all possible water sources [4]. Since agriculture in dry and semi-dry areas, including Iraq, is irrigated agriculture as it relies mainly on irrigation to produce food, Iraqi agriculture is facing a major challenge in confronting the shortage of water resources, which has been affected by irrigation projects, systems, and dams of neighboring countries, which will affect the development of agricultural production and food security [5]. One of the important problems currently facing irrigated agriculture in the world is the decline in the quantity of fresh water, as the scarcity of fresh water hinders the development of sustainable agriculture. At the same time, the deterioration in the quality of irrigation water has led to an increase in the use of saline water in agriculture in order to overcome the problem of drought and maintain crop productivity. The population growth around the world requires more food, and thus food production requires more efficient use of water in irrigated agriculture, as the competition for fresh water in the field of agriculture, industry, and urban development has led to a decrease in the amount of fresh water used for irrigation purposes [6]. The agricultural area has expanded significantly in recent years, especially the cultivation of wheat in dry and semi-dry areas, and this large and rapid expansion was accompanied at the same time by the use of modern irrigation systems [7]. With the steady increase in population numbers and their growing food needs, it has become necessary to expand the establishment of agricultural projects, reclaim land, and constantly work to

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improve agricultural production to provide the necessary food and achieve food security , and this, of course, requires expansion in irrigation projects. This expansion means consuming large amounts of water, which may affect the strategic water reserve in countries, especially those with limited irrigation sources. Therefore, efforts must always be made to rationalize water consumption and preserve it by choosing the optimal irrigation system [8]. Therefore, the use of modern irrigation methods has become necessary in the present time, as they are water-saving methods, since the world is currently suffering from a shortage of water sources. Therefore, water must be conserved as much as possible, and one of the most prominent methods of water conservation is the use of modern irrigation methods [9].

Accordingly, what water resources represent in terms of central importance to agricultural development in Iraq, and also being the basic element of life and sustainable development, and their direct connection to food security, especially in light of the relative scarcity of these resources, in addition to the great waste in water resources as a result of irrational exploitation of water, along with poor management and the randomness that has become a characteristic casting its shadow over this sector—this all calls for giving appropriate attention to analysis, study, and research in all issues and aspects that would contribute to the development and preservation of these resources, and achieving the highest possible levels of rationalization and efficiency of use.

Therefore, care for water exploitation and preservation has become more important than before. It has become a necessity to pay great attention to water, by giving it significant importance in improving the use and management of available resources and expanding the dissemination of the use of modern irrigation techniques, such as drip irrigation and the use of sprinklers of their various fixed and mobile types according to the nature of the agricultural crop, as they are effective means to regulate the use of water for agricultural purposes.

As a result of what has been mentioned about the importance of irrigation in crop cultivation and the use of irrigation methods, it has become necessary to investigate the reality of using modern irrigation methods and to search for the determinants of using modern irrigation methods in Nineveh Governorate, where the Namrod was selected within Nineveh Governorate to study the determinants of using modern irrigation methods. The research answered the following questions:

1- What are the determinants of using modern irrigation methods by the farmers of Namrod Sub-district / Nineveh Governorate in general?

2- What is the ranking of the items of the determinants of the use of modern irrigation methods by the farmers of Namrod / Nineveh Governorate?

3- What is the correlation relationship between the determinants of the use of modern irrigation methods by the farmers of Namrod / Nineveh Governorate and each of the study variables included in the research?

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Research Objectives

1- Identify the determinants of using modern irrigation methods by farmers in Namrod / Nineveh.
2- Ranking the items of the determinants of using modern irrigation methods by farmers in the Namrod / Nineveh Governorate.
3- Finding the correlative relationship between the determinants of the use of modern irrigation methods by the farmers of the Namrod / Nineveh Governorate and the following independent variables (educational qualification, agricultural holding, type of ownership, **number of years of experience, participation in training courses in the field of modern irrigation methods, sources of information in the field of modern irrigation methods).**

Research Materials and Methods

The research population included all farmers in the Namrod subdistrict, totaling (500) farmers. A simple random sample of (20%) was selected, resulting in a final research sample of (100) farmers. Data were collected from the farmers, and a questionnaire form was prepared after reviewing the previous literature related to the research topic. The questionnaire form consisted of two parts.

The first part included the following independent variables: (educational qualification, number of years of experience, agricultural holding, type of ownership, participation in training courses in the field of modern irrigation methods, sources of information in the field of modern irrigation methods).

1- Educational qualification was measured by assigning numerical codes to the following levels: illiterate (1), can read and write (2), primary (3), intermediate (4), secondary (5), bachelor's (6), higher degree (7).

2- Agricultural holding was measured by asking farmers if they own agricultural lands in donums.

3- Type of ownership was measured by assigning numerical codes to the following levels: (1) owned, (2) rented, (3) shared, (4) state-owned.

4- Number of years of experience was measured by calculating the number of years of agricultural experience.

5- Participation in training courses in the field of modern irrigation methods was measured by assigning numerical codes to the following levels: (1) yes, (2) no.

6- Sources of information in the field of modern irrigation methods were measured through (8) sources of information, with three options placed in front of them: (always, sometimes, I do not receive), and numerical codes were assigned to the options respectively: (1, 2, 3), and the total score represents this variable.

The second part of the questionnaire included a number of items regarding the determinants of using modern irrigation methods in the Namrod, amounting to (27) items. Four options were placed in front of each item: (determinant to a high degree, determinant to a medium degree, determinant to a low degree, no determinant), and the following numerical values were given respectively: (1, 2, 3, 4).

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Thus, the total score represents the determinants of using modern irrigation methods in the Namrod.

The face validity of the questionnaire was confirmed by presenting it to a group of professors from the Department of Agricultural Extension and Technology Transfer and professors from the Department of Soil and Water Resources Sciences. Based on their suggestions, some items were rephrased and others were excluded. A preliminary test was conducted on a random sample consisting of (30) farmers, who were excluded from the final sample (exploratory sample), Reliability was extracted using Cronbach's Alpha from the pilot sample, and the overall reliability reached (82) [10]. Data were collected during the period from (1 / 11 / 2024) to (1 / 1 / 2025), and were analyzed using the SPSS program [11].

Results and Discussion

1- Identifying the determinants of using modern irrigation methods by farmers in the Namrod / Nineveh Governorate in general.

The determinants of using modern irrigation methods by farmers in the Namrod / Nineveh Governorate in general were classified into three categories using the range method, where the scores ranged between (41 - 98). The lowest value was (41) and the highest value was (98), as shown in the following table.

Table (1) shows the distribution of farmers into categories according to the determinants of the use of modern irrigation methods.

overall average	Percentage %	Number frequency	Categories of modern irrigation determinants
47	5	5	Low (41-59)
72.842	38	38	Medium (60-78)
86.121	57	57	High (79-98)
	100	100	Total

It is clear from Table (1) that the average for the low category (41–59) is (47) with a percentage of (5%), the average for the medium category (60–78) is (72.842) with a percentage of (38%), and the average for the high category (79–98) is (86.121) with a percentage of (57%). It is evident that the high category obtained the highest percentage. This means that the determinants of using modern irrigation methods by farmers in the Namrod are high. According to this result, there are determinants that hinder the use of modern irrigation methods by farmers in the Namrod / Nineveh Governorate, and they are characterized by their impact on the cultivators' use of modern irrigation methods. These determinants are generally varied.

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2- Ranking the items of the determinants of using modern irrigation methods by farmers in the Namrod / Nineveh Governorate.

Table (2) shows the ranking of the items of the determinants of using modern irrigation methods by farmers in the Namrod according to their arithmetic means.

Rank	Arithmetic mean	Items	No
1	3.58%	Requires electrical power sources when operating.	1
2	3.45%	Modern irrigation methods are expensive and expensive.	2
3	3.42%	It needs constant monitoring, especially in cases of continuous daily irrigation.	3
4.5	3.31%	You need a permanent water source such as tanks.	4
4.5	3.31%	Providing very high compressive strength for the operation of modern irrigation methods.	5
6.5	3.05%	The valves need constant maintenance due to the accumulation of salts and dirt in them.	6
6.5	3.05%	The effect of wind on sprinkler movement and water distribution.	7
8	3.04%	Pipes used in modern irrigation methods are damaged when exposed to sunlight.	8
9	3.3%	Modern irrigation road networks require continuous maintenance, operation and control.	9
10	3.02%	Failure to install a modern irrigation system properly leads to water waste.	10
11.5	2.99%	Modern irrigation road networks require highly qualified labor to establish them.	11
11.5	2.99%	Difficulty in providing high altitude for modern irrigation methods.	12
14	2.86%	Difficulty in studying all factors related to climatic	13

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		conditions.	
14	2.86%	Difficulty in obtaining a license to drill wells from the relevant departments.	14
14	2.86%	Lack of support provided to farms by the agricultural division in the region.	15
16	2.81%	Some farmers have hesitated to use modern irrigation methods due to adherence to traditional methods.	16
17	2.78%	Difficulty in studying all factors related to types of agricultural crops.	17
18	2.68%	It needs regular agricultural lands.	18
19	2.67%	Difficulty in studying all soil-related factors.	19
20.5	2.65%	The impact of droplets on the soil and seedlings negatively affects seedling growth.	20
20.5	2.65%	Difficulty in studying all water-related factors.	21
22	2.54%	Difficulty in studying all factors related to the Earth's topography.	22
23	2.44%	Soil compaction occurs as a result of water droplets falling on its surface by spraying.	23
24	2.41%	The sprinkler irrigation method leads to the spread of the causes of some fungal and bacterial diseases.	24
25	2.9%	Water falling directly on the leaves causes harm to the plant when irrigated with poor quality water.	25
26	2.8%	It takes a lot of time to maintain, especially in large spaces.	26
27	2.7%	Fear of the dangers of plastic made from pipes..	27

Table (2) above shows the ranking of the items of the determinants of using

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modern irrigation methods by farmers in the Namrod according to their arithmetic means. It was found that the item that ranked first is the item "Requires electrical power sources when operating" with an arithmetic mean of (3.58%), and this may be due to the fact that the use of modern irrigation methods by farmers in the Namrod requires power sources for operation. This is a realistic constraint resulting from the electricity crisis the country is facing, which made it rank first as a determinant. The item that ranked second is " Modern irrigation methods are expensive and expensive " with an arithmetic mean of (3.45%), and this may be due to the fact that the use of modern irrigation methods by farmers in the Namrod is considered costly and expensive by most farmers, which made it rank second as a determinant. While the item " It takes a lot of time to maintain, especially in large spaces " ranked second to last with an arithmetic mean of (2.8%), this means that modern irrigation methods do not require a lot of time for maintenance, especially in large areas, and therefore are not considered a major determinant of their use by the farmers of Namrod. While the item " Fear of the dangers of plastic made from pipes." ranked last with an arithmetic mean of (2.7%), this means there is no fear of the risks of plastic used in the pipes, and therefore it is not considered a determinant of the use of modern irrigation methods by the farmers of Namrod. The determinants may lie in other aspects.

3. Finding the correlative relationship between the determinants of the use of modern irrigation methods by the farmers and the following independent variables: (educational qualification, agricultural holding, type of ownership, number of years of experience, participation in training courses in the field of modern irrigation methods, sources of information in the field of modern irrigation methods).

1-Educational qualification:

The cultivators were classified according to the ranks shown in educational qualification in Table (3), where it is clear from the table that (2%) of the illiterate cultivators had low determinants, and the lowest percentage of them (1%) had medium determinants. As for the cultivators in the "read and write" category, the highest percentage was among those with high and low determinants (3%), and they are equal, and the lowest percentage was among those with medium determinants (1%). The cultivators in the "primary" category had the highest percentage of those with medium determinants (14%) and the lowest were those with low determinants (8%). The cultivators in the "intermediate" category had the highest percentage of those with low determinants (6%) and the lowest were with high determinants (0%). The cultivators in the "secondary" category had the highest percentage of those with low determinants (7%) and the lowest were with high determinants (1%). The cultivators in the "bachelor’s degree" category had the highest percentage of those with low determinants (30%) and the lowest were with high determinants (0%). The cultivators in the "secondary" category had the highest percentage of those with low determinants (1%) and the lowest were with high determinants (0%). The cultivators in the

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"postgraduate" category had the highest percentage of those with medium and low determinants (1%) and they are equal, and the lowest were with high determinants (0%), as shown in Table (3).

Table (3): Classification of cultivators according to the variable of educational qualification and its relationship with the determinants of the use of modern irrigation methods.

significance level	**Sig-value**	**Calculated Ch2 value**	**Few determinants (79 – 98)**		**Medium determinants (60 – 78)**		**Big determinants (41 – 59)**		**Determinants**	**No**
			%	Repetition	%	Repetition	%	Repetition	educational qualification	
			2	2	1	1	0	0	illiterate	1
			3	3	1	1	3	3	Reads and writes	2
			8	8	14	14	1	1	Primary	3
0.05	0.001	33.144*	6	6	5	5	0	0	Intermediate	4
			7	7	5	5	1	1	Preparatory	5
			30	30	11	11	0	0	Bachelor	6
			1	1	1	1	0	0	Higher degree	7
			57	57	38	38	5	5	total	

To find the correlation between the determinants of the use of modern irrigation methods and the educational qualification, Chi-square was used, where its value was (*33.144) and the sig value (0.001), which is significant at (0.05). The reason for this is that farmers with a high educational level know exactly what the determinants are in the use of modern irrigation methods by the farmers of Namrod, and this may be due to the experience they acquired through education or that education pushed them to search for the determinants of the use of modern irrigation methods and to overcome them.

2- Agricultural holding:

The categories of farmers were classified according to their farm holdings based on the ranks shown in Table No. (4), where it was found that the highest percentage (5%) of the cultivators within the low category are the category of high determinants, and the lowest percentage (0%) is from the category of medium and low determinants. The highest percentage of cultivators within the medium category (28%) are the category of high determinants, and the lowest percentage (2%) are from the low determinants category. The highest

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percentage of cultivators within the high category (50%) are the high determinants category, and the lowest percentage (3%) are from the low determinants category, as shown in Table (4).

Table (4): Classification of cultivators according to the variable of agricultural holding and its relationship with the determinants of the use of modern irrigation methods.

significance level	Sig-value	Calculated Ch2 value	Few determinants (79 – 98)		Medium determinants (60 – 78)		Big determinants (41 – 59)		Determinants	No
			%	Repetition	%	Repetition	%	Repetition	agricultural holding	
0.05	0.252	5.362	0	0	0	0	5	5	Low (4–52)	1
			2	2	8	8	28	28	Medium (53–101)	2
			3	3	4	4	50	50	High (102 and above)	3
			5	5	12	12	83	83	total	

To find the correlation between the determinants in the use of modern irrigation methods and the agricultural holding, Chi-square was used and its value was (5.362) and the sig value (0.252), which is not significant. This means that the agricultural holdings owned by the cultivators have no relation with the determinants of using modern irrigation methods, that is, the cultivators regardless of their agricultural holdings are capable of knowing the determinants of using modern irrigation methods.

3- Type of ownership:

The categories of farmers were classified according to the variable of ownership type based on the ranks shown in Table No. (5), where it is evident that the highest percentage. (35%) of cultivators within the "owned" category is within the category of low determinants and the lowest percentage (2%) are within the high determinants category. The highest percentage of cultivators within the "rent" category (3%) are from the medium determinants category, and the lowest percentage (1%) are from the high and low determinants category. The highest percentage of cultivators within the "partnership" category (10%) are from the low determinants category, and the lowest percentage (2%) are from the high determinants category. The highest percentage of cultivators within the "state-owned" category (11%) are from the medium and low determinants categories, and the lowest percentage (0%) are from the high determinants category, as shown in Table (5).

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Table (5): Classification of cultivators according to the variable of ownership type and its relationship with the determinants of the use of modern irrigation methods.

significance level	Sig-value	Calculated Ch2 value	Few determinants (79 – 98)		Medium determinants (60 – 78)		Big determinants (41 – 59)		Determinants	No
			%	Repetition	%	Repetition	%	Repetition	Type of Ownership	
0.05	1.191	8.697	35	35	18	18	2	2	Owned	1
			1	1	3	3	1	1	Rented	2
			10	10	6	6	2	2	Shared ownership	3
			11	11	11	11	0	0	Government-owned	4
			57	57	38	38	5	5	total	

To find the correlation between the determinants in the use of modern irrigation methods and the type of ownership, Chi-square was used where its value was (8.697) and the sig value (0.191), which is not significant. This may be due to the fact that the type of ownership is not related to the determinants of the use of modern irrigation methods by the farmers of Namrod. That is, the farmers, regardless of the type of ownership, are capable of knowing the determinants of using modern irrigation methods.

4- Number of years of experience for farmers:

The categories of cultivators were classified according to the number of years of experience for farmers according to the ranks shown in Table No. (6), where it is clear from the table that the highest percentage (35%) of cultivators within the low category are from the low determinants category, and the lowest percentage (4%) are from the high determinants category. The highest percentage of cultivators within the medium category (13%) are from the low determinants category, and the lowest percentage (0%) are from the high determinants category. The highest percentage of cultivators within the high category (10%) are from the medium determinants category, and the lowest percentage (1%) are from the high determinants category, as shown in Table (6).

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Table (6): Classification of cultivators according to the variable of farmers' years of experience and its relationship with the determinants of the use of modern irrigation methods.

significance level	**Sig-value**	**Calculated Ch2 value**	**Few determinants (79 – 98)**		**Medium determinants (60 – 78)**		**Big determinants (41 – 59)**		**Determinants**	**No**
			%	Repetition	%	Repetition	%	Repetition	Years of Experience	
0.05	0.523	3.212	35	35	22	22	4	4	Low (2–15)	1
			13	13	6	6	0	0	Medium (16–29)	2
			9	9	10	10	1	1	High (30–44)	3
			57	57	38	38	5	5	total	

To find the correlation between the determinants in the use of modern irrigation methods and the type of ownership, Chi-square was used and its value was (3.212) and the sig value (0.523), which is not significant. This may be due to the fact that the number of years of experience is not related to the determinants of the use of modern irrigation methods. That is, the cultivators from the farmers, regardless of the number of years of their farming experience, are capable of knowing the determinants of the use of modern irrigation methods.

5 – Participation in training courses in the field of the use of modern irrigation methods:

The categories of cultivators were classified according to the participation of farmers in training courses in the field of the use of modern irrigation methods according to the ranks shown in Table No. (7), where it is clear from the table that the highest percentage (12%) in the "participant" category was within the medium determinants category, and the lowest percentage (3%) are from the high determinants category. The highest percentage of cultivators within the "non-participant" category (50%) are from the low determinants category, and the lowest percentage (2%) are from the high determinants category, as shown in Table (7).

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Table (7): Classification of cultivators according to the variable of participation in training courses in the field of the use of modern irrigation methods and its relationship with the determinants of the use of modern irrigation methods.

significance level	Sig-value	Calculated Ch2 value	Few determinants (79 – 98)		Medium determinants (60 – 78)		Big determinants (41 – 59)		Determinants	No
			%	Repetition	%	Repetition	%	Repetition	Participation in Training Courses	
0.05	0.009	*9.377	7	7	12	12	3	3	Participant	1
			50	50	26	26	2	2	Non-participant	2
			57	57	38	38	5	5	total	

To find the correlation between the determinants in the use of modern irrigation methods and participation in training courses in the field of the use of modern irrigation methods, Chi-square was used where its value was (9.377) and the sig value (0.009), which is significant. This may be due to the fact that farmers who participate in training courses in the field of the use of modern irrigation methods are more aware of the determinants in the field of the use of modern irrigation methods through the knowledge and experience they obtained as a result of participating in the training courses.

6- Sources of information in the use of modern irrigation methods:

The categories of cultivators were classified according to the sources of information according to the ranks shown in Table No. (8), where it is clear from the table that the highest percentage (20%) of cultivators within the low category are from the medium determinants category and the lowest percentage (2%) are from the high determinants category. The highest percentage of cultivators within the medium category (38%) are from the low determinants category, and the lowest percentage (3%) are from the high determinants category. The highest percentage of cultivators within the high category (5%) are from the medium determinants category, and the lowest percentage (0%) are from the high and low determinants categories, as shown in Table (8).

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Table (8): Classification of cultivators according to the variable of sources of information and its relationship with the determinants of the use of modern irrigation methods.

significance level	**Sig-value**	**Calculated Ch2 value**	**Few determinants (79 – 98)**		**Medium determinants (60 – 78)**		**Big determinants (41 – 59)**		**Determinants**	**No**
			%	Repetition	%	Repetition	%	Repetition	Sources of Information	
0.05	0.523	3.212	19	19	20	20	2	2	Low (9–12)	1
			38	38	13	13	3	3	Medium (13–16)	2
			0	0	5	5	0	0	High (17–21)	3
			41	41	54	5	5	5	total	

To find the correlation between the determinants of the use of modern irrigation methods and the sources of information in the use of modern irrigation methods, Chi-square was used and its value was (6.877) and the sig value (0.032), which is significant. This may be due to the fact that farmers who are exposed to sources of information are more aware of the determinants of the use of modern irrigation methods, through the information they obtain from multiple knowledge sources such as the internet and others, which are considered essential in enhancing their expertise in this field.

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Conclusions

1- The results showed that the determinants of the use of modern irrigation methods by the farmers of Namrod are high; we conclude from this that there are determinants in the use of modern irrigation methods in the Namrod, and these determinants are diverse.
2- The results showed a significant correlation between the determinants of the use of modern irrigation methods and the following variables (educational qualification, participation in training courses in the field of modern irrigation methods, sources of information in the field of modern irrigation methods); we conclude from this that these variables are associated with the determinants of the use of modern irrigation methods and they determine their ability and capacity to know the determinants in the use of modern irrigation methods.
3- The results showed a non-significant correlation between the determinants of the use of modern irrigation methods and the following variables (number of years of experience, agricultural holding, type of ownership); we conclude from this that these variables have a role and relation to knowing the determinants of the use of modern irrigation methods and may depend on other variables.
4- The researcher also concluded that some items of the field of determinants of the use of modern irrigation methods are of importance in the reality of the use of modern irrigation methods.

Recommendations

1- The Directorate of Agriculture of Nineveh Governorate and the Nineveh Center for Agricultural Extension and Training should intensify training courses for farmers in the field of the use of modern irrigation methods.
2- The researchers recommend taking care of the farmers in the study area and providing them with how to use modern irrigation methods.
3- The researchers recommend conducting studies that address the importance of the use of modern irrigation methods, which were not covered by the research, and other variables in the study Area.
4- The researchers recommend training farmers on how to choose modern irrigation methods according to the reality of their land.

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