

Evaluating the role of agricultural extension in applying green marketing and encouraging environmentally friendly products in Nineveh Governorate

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ABSTRACT

Research aims to evaluating the role of agricultural extension in applying green marketing and encouraging to environment friend products in Nineveh Governorate in general , also arrangement of fields concerned with evaluating the role of agricultural extension in applying green marketing and encouraging to environment friend products in Nineveh Governorate: Organization the design products friend to environment ,implementation decrees carbonic fingerprint ,planning to sustainable packaging, evaluation the transparent marketing and credibility, follow-up of innovation in products and services ,also finding the correlation between evaluation and some variables: field of the agriculture extension, type of the certificate; period of the service in office; office degree, finally activities of the participation agriculture techniques of green marketing ,to achieve these aims had been prepared area questioner (virtual validity had been verified) consisting of two part : In the first personal variables while in the second there are 68 items divided in to five measures ,prepared after reading books, publishes , interviews related with specialists , research community consisted of percentage (18.44%) which equal (71) of employees in Nineveh Governorate, test sample content of 20 employees { out of research final sample} the most important results in evaluating the role of agricultural extension in applying green marketing were(medium) tend to(high), then three variables : Type of scientific and participation with extensional activities and office degree have a significant differences on the evaluating the role of agricultural extension in applying green marketing ,most important conclusions were to concern on activities of the participation and high office degree of employees that because making an important role of agricultural extension in applying green marketing.

Key Words: green marketing, environment friend products, green products, decrees carbonic fingerprint

INTRODUCTION AND RESEARCH PROBLEM

In an era of increasing environmental awareness and sustainability, the concept of green marketing emerges as an effective strategic tool that seeks to balance commercial activities with environmental protection. Green marketing has become one of the most contemporary topics in the field of marketing, witnessing a significant transformation in its application within sustainable development over the past few decades (Al-Hasri et al., 2022). Green marketing is considered a contemporary and significant topic that modern studies focus on, receiving attention from the international community and global food organizations. It is one of the programs aimed at economic agriculture that seeks to achieve sustainable development (Abbas, 2023). Its objective is to balance agricultural production with environmental protection while enhancing economic and social well-being for farmers and rural communities, and mitigating the adverse effects of human activities on climate change, resource depletion, and global warming. The concept of green marketing has emerged as a system for environmental protection by utilizing renewable energy technologies, green buildings, recycling agricultural production waste, and information systems (Al-Sabbagh et al., 2023), as shown in the figure (1) <http://medium.com/@jacopo.kronos.attardo/greenwashing-facciamo-chiarezza-d6edbfd51a1c>



figure (1) The concept of green marketing

With the increasing awareness of consumers and the changing attitudes towards eco-friendly products, organizations and companies have shown a keen interest in green marketing, implementing all its strategies according to a set of planned activities aimed at maximizing impact on consumers and ensuring the competitiveness of their products. This is achieved through four key elements: green product, green price, green place, and green promotion (Ibrahim et al., 2017). The concept of the natural environment refers to the physical and biological surroundings composed of living organisms and natural resources that surround humans, characterized by interrelated and integrated relationships that represent the general natural ecosystem (Hani, 2018). There has been a growing international interest in the environment, which has become a significant issue due to the impact of recent environmental disasters on agricultural and industrial production and their implications for living standards. Increasing pressure from environmental activist groups led to the establishment of Earth Day for the first time in 1970 to address the depletion and exploitation of natural resources, environmental damage, and rising pollution levels. Consequently, the international political response to climate change began with the United Nations adopting the Framework Convention on Climate Change in 1992, which established a structured approach and solidified the foundational pillars (Hiba, 2021). Agricultural guidance plays a crucial role in improving and developing agricultural production and its practices. It serves a pivotal role in promoting green marketing for agricultural products by focusing on sustainability and environmental awareness to achieve economic benefits for both farmers and consumers (El-Sharbatly, 2024). This is accomplished through the adoption of sustainable farming practices by farmers and their impact on product quality and health. Additionally, agricultural guidance contributes to training farmers on the methods of transferring sustainable agricultural technologies and enhancing their efficiency in resource utilization (Kadhun, 2023). This research has the possible to advantage employees in agricultural extension through enabling the transference of plants; programs; and extensional activities to the farmers. (Al-Hafidh and et al.), it also aids in directing farmers to assess the environmental and economic impacts of their agricultural practices, assisting them in making informed decisions to improve the application of these practices (Al-Sayed, 2022) extension employees, that is needed to involve him in training courses, and to achieve areal meaningful & sustainable development as well as active plan final to develop the agriculture extension staff (Al-Hafidh and Ahmed,2023) In recent decades, there has been a clear shift in the concept of development and its measurement methods. Development is defined as meeting the current needs without compromising the ability of future generations to

meet their own needs, encompassing economic, social, and environmental dimensions (Othman & Majida, 2021). as shown in the figure (2) <https://businessjargons.com/green-marketing.html>



figure (2) the principles of green marketing

It is also characterized as the preservation and sustainability of diverse resources in the environment to meet the current economic and social needs of humanity, managed scientifically and using the latest technologies to avoid resource wastage, thereby ensuring their availability for future generations (World Health Organization, 2021). the use of precision livestock farming (PLF) methods—including automated feeding systems, wearable animal sensors, and behavior monitoring tools—has greatly enhanced the health and productivity of farm animals.(Al-Hafidh and Ahmed,2024),however ,the previous studies Study (Al-Nabulsi, 2010) Adoption of Green Marketing in the Industrial Sector:The purpose of this study is to clarify the impact of internal and external factors, including environmental, social, legislative, and legal elements that support the adoption of green marketing in Jordanian industrial organizations, and to identify the areas of green marketing that have the most significant influence and guide management in their implementation. The study concluded that external factors in the Jordanian market significantly affect the adoption of green marketing, while there is a lack of awareness regarding the importance of green marketing among producers in the Jordanian industrial sector. Also study (Al-Momani, 2015) The Impact of Green Marketing Application on Marketing Performance, this study aims to identify the impact of green marketing application on the marketing performance of Jordanian electrical appliance companies through key aspects of green marketing. To achieve the study's objectives, a descriptive research methodology was employed, and a questionnaire was utilized to gather relevant data. The study recommended that companies continue to apply green marketing in all their dealings due to its effectiveness in reducing costs. Also Study (Al-Momani, 2015) the Impact of Green Marketing Application on Marketing Performance, this study aims to identify the impact of green marketing application on the marketing performance of Jordanian electrical appliance companies through key aspects of green marketing. To achieve the study's objectives, a descriptive research methodology was employed, and a questionnaire was utilized to gather relevant data. The study recommended that companies continue to apply green marketing in all their dealings due to its effectiveness in reducing costs. Also Study (Leonida C. Kasts et al., 2021) This study addressed the importance of adopting a strategy by economic institutions to develop their marketing programs from a traditional concept to a sustainable concept to achieve distinctive competition. This can only be realized by considering both environmental and social dimensions, and finally study (Mary Wanjiru Kinooti, 2020) This study aimed to explore the role of green marketing in enhancing company performance and the extent of management's commitment to implementing fundamental programs. It asserts that proper scientific application of these programs positively reflects on production, improves the company's acceptance in communities, increases market sales, and achieves profitability

Research Problem

The rising levels of environmental pollution in many countries, reaching alarming indicators, have directed global attention towards environmental issues. The indiscriminate use of chemicals and fertilizers by farmers and agricultural companies is one of the primary causes of increased environmental pollution. The role of green marketing emerges by requiring these companies to implement eco-friendly products, reconsider their social and ethical responsibilities, and give significant importance to the environmental dimension in their marketing strategies (Al-Awad, 2018). The core problem of this research revolves around answering the following question: What is the role of implementing green marketing in achieving sustainable development goals in agricultural production?

Research objectives

Aim this study to evaluating the role of agricultural extension in applying green marketing and encouraging to environment friend products in Nineveh Governorate by sub drives:

In the first: Evaluating the role of agricultural extension in applying green marketing and encouraging to environment friend products in Nineveh Governorate in general.

In the second: Rearrangement measures which concerned with evaluating the role of agricultural extension in applying green marketing and encouraging to environment friend products in Nineveh Governorate: Organization the design products friend to environment, implementation decrees carbonic fingerprint, planning to sustainable packaging, evaluation the transparent marketing and credibility, follow-up of innovation in products and services

In the third: Finding relationships between valuating the role of agricultural extension in applying green marketing and encouraging to environment friend products in Nineveh Governorate and the factors: field of the agriculture extension, type of the certificate, period of the service in office, office degrees, activities of the participation.

MATERIALS AND METHODS

Research had been used the descriptive approach because of it is appropriating of describe data about evaluating the role of agricultural extension in applying green marketing and encouraging to environment friend products in Nineveh Governorate; it be sequence affording to the Mean of its measures; then to applying these aims area questionnaire has been done ,and collect research data ,which consisted of two parts first one :consisted personal variables : field of agriculture extension: 1 to specialist in agriculture extension 2 to not specialist in agriculture extension; type of a certificate : 1 to certificate in institute 2 to certificate in college 3 to certificate in master 4 to certificate of ph. D ;while period of service in office 1 to few year 2 to median year 3 to big year; office degree in office work 1 to assistant of agricultural engineer 2 to agricultural engineer 3 to first agricultural engineer 4 to assistant of engineers president 5 to engineers president 6 to first engineers president 7 to expert, activities of participation ; then data of this factor gotten by summation number of the activities days of each of activity, as well as data has been divided in four categories; the following part prepared to measure evaluating the role of agricultural extension in applying green marketing and encouraging to environment friend products in Nineveh Governorate involved five measure ,each of these consists of the pentagon measure ; refers to decision of the options of these applying [very greatly applying; greatly applying; appropriately applying; didn't greatly applying ; didn't very greatly applying] had been given them weights [5,4,3,2,1] in sequence of {76} items at the beginning , then at the last form were 68 items , removed because it isn't appropriate of its validity, (validity test) was tested of apparent validity [in pre-test sample] which was 20 of agricultural employees [out final sample] , community of research is consisting of {71} agricultural employees which taken random final sample from the total of society which was (385) equal (18.44%), to measure stability has been used Alpa-Cronbakh statistical tool of each of five scales: were organization 0.967 planning 0.986 ,implementation 0.979 ,monitoring 0.973, evaluation 0.989 that means a very high degrees and acceptable reliability factor and we can rely on it in our research ,statistical methods which used; simple correlation factor; percentage, orders correlation factor, Alfa Cronbach , Frequency.

RESULTS AND DISCUSSION

The first objective: Evaluating the role of agricultural extension in applying green marketing and encouraging to environment friend products in Nineveh Governorate in general

Results showed that the numerical values are expressing the evaluation the role of agricultural extension in applying green marketing and encouraging to environment friend products ranged first level between (186-252) with ratio of (42.25%) then second scale value was limited between (253-320) with ratio of (29.57%) while the third one (119-185) with ratio of (28.16%), the respondents were divided into three categories using the range, as shown in the table (1)

Table (1) Distribution of respondents according to the evaluating the role of agricultural extension in applying green marketing and encouraging to environment friend products in Nineveh Governorate in general

Table (1) Distribution of employees according to evaluation of applying green marketing in a general.

	Evaluation Level	N	%	Mean
1	Low (119-185)	20	28.16%	26.28
2	Medium (186-252)	30	42.25%	52.46
3	High (253-320)	21	29.57%	34.42
	Total	71	100%	37.72

Mean = 37.72

S.D = 2.37

As illustrated in table (1) when data distributed of employees according to evaluation of applying green marketing in a general reached to category of Medium level (186-252) gains first arrangement trend to high, that agreement with study of (Al-Hafidh and Ahmed,2024) and disagreement with hypothesis of research.

When tested normality of data by Kolmogorov-Smirnov & Shapiro-Wilk illustrated that the distributed of data was normality at significant level 5% as clear in table 2 and figure 3:

Table (2) Lilliefors Significance Correction to evaluation of applying green marketing in a general.

	Kolmogorov - Smirnov ^a			Shapiro - Wilk		
	Statistics	Df.	Sig .	Statistics	Df.	Sig .
evaluation	0.089	71	0.200*	0.964	71	0.109

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

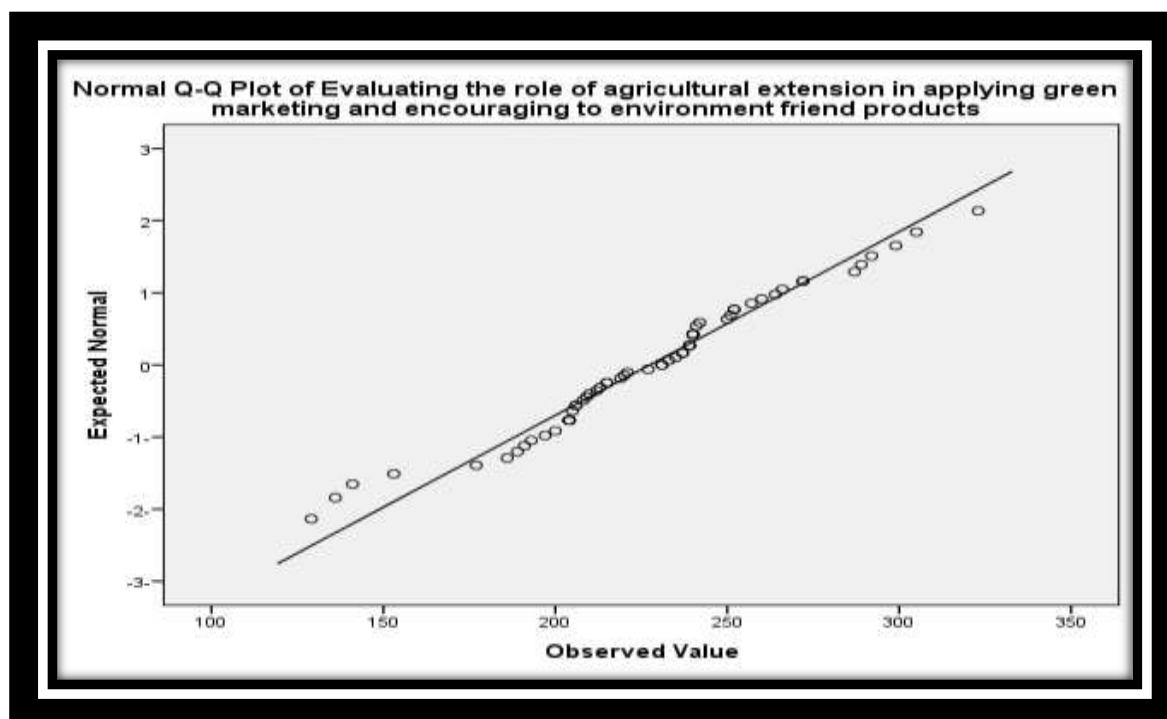


Figure (3) Distribution the normality of employees according to evaluation of applying green marketing

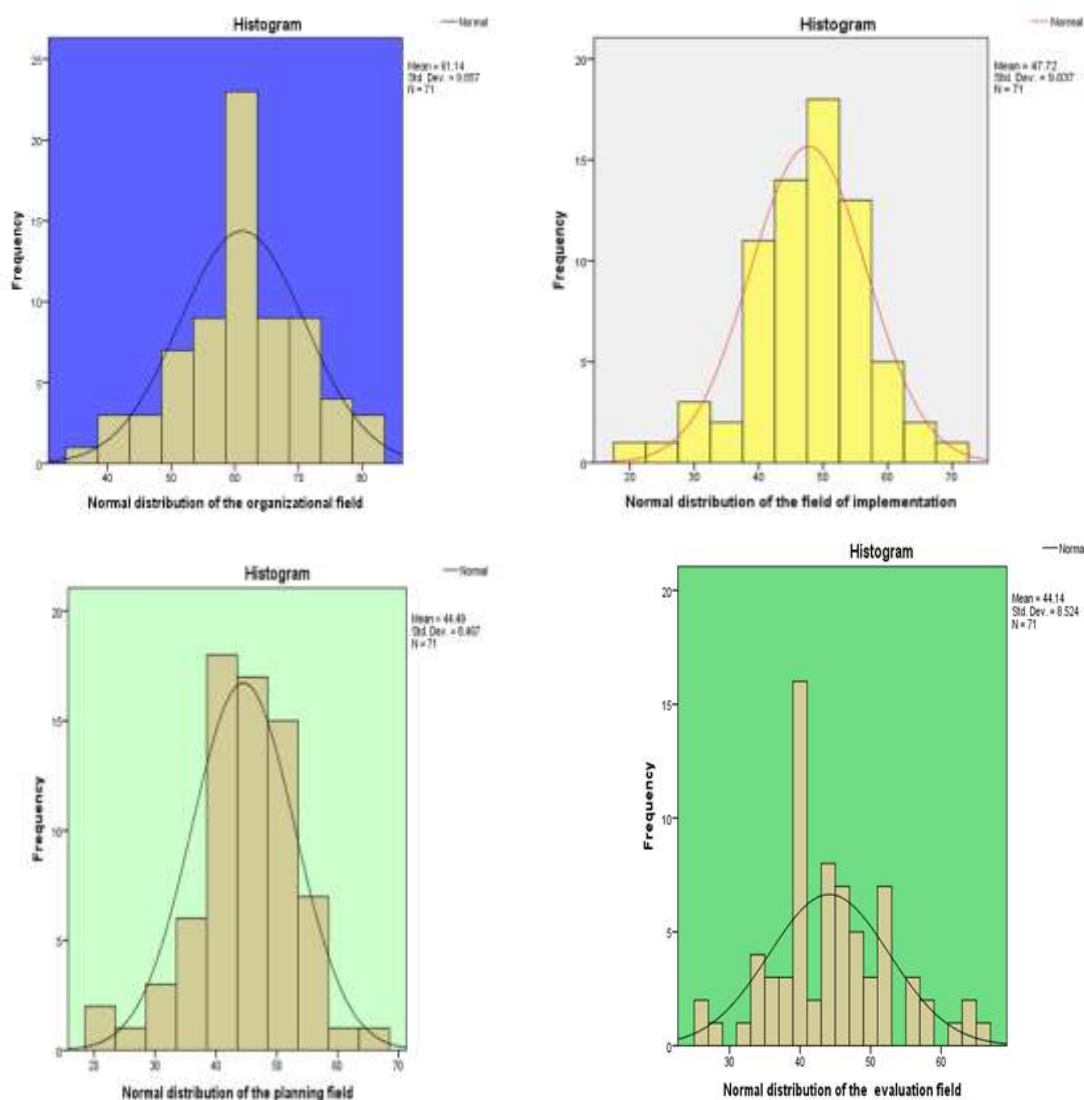
It is clear from Table (1) the highest percentage of the respondents was in the medium evaluation category (42.25%), followed by the high evaluation category, and their percentage in it was (29.57%), so it can be described

the agricultural employees evaluation in applying green marketing and encouraging to environment friend products in Nineveh Governorate in general is a good indicator for increasing the chances of applying green marketing techniques and encouraging to environment friend products ; which calls for strengthening this type of evaluation agricultural employees and trying to modify weak applying through information and guidance programs to clarify the importance of green marketing and their benefits to the family and the society

The second objective: Arrangement of fields concerned with evaluating the role of agricultural extension in applying green marketing and encouraging to environment friend products in Nineveh Governorate: evaluation, organization, planning, monitoring, and implementation according to the arithmetic mean:

As illustrated in figure (2) when data distributed of employees according to evaluation fields all of the curves present near to natural distribution in all fields.

As illustrated in the previous figures and table show that the field of (Organization the design products friend to environment) occupied first place an arithmetic mean (61.14) according to the level of evaluation of respondents about evaluation of applying green marketing. Then the reason for this might be because the employees are aware that of field organization, that is one of most important fields in the fields of evaluation the applying green marketing to service and help farmers applying green agriculture and marketing products environmental friend, and the field of (Follow-up of innovation in products and services) occupied last place an arithmetic Mean (34.38). Then the reason of this, the applying level of respondents is very low and need to reinforcement it and strengthen it reaching to high levels of applying to the green marketing as well as keeping to product environmental friends products.



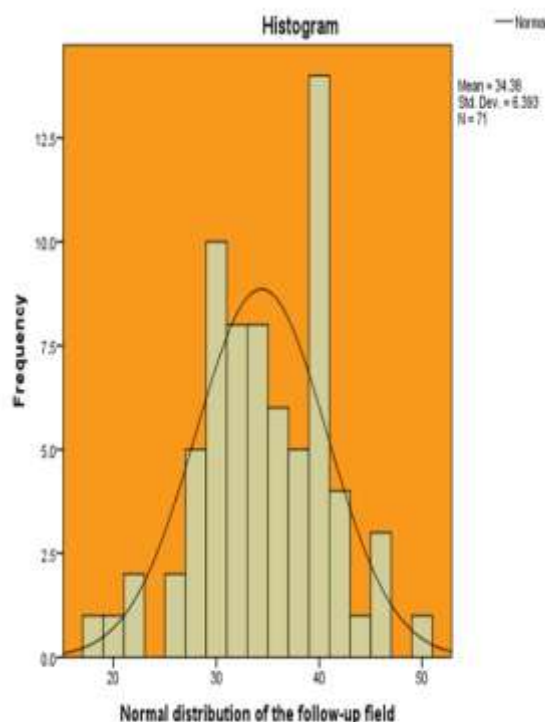


Figure (4) Distribution the normality of employees according to evaluation fields

Table (3): Distribution of fields according to the means of respondents 'evaluation level

Fields	Minimum Value	Maximum Value	Mean	Standard Score	Rank
Organization the design products friend to environment	31	94	61.14	9.85	1
Implementation decrees carbonic fingerprint	17	60	47.72	9.03	2
Planning to sustainable packaging	25	65	44.49	8.46	3
Evaluation the transparent marketing and credibility	20	62	44.14	8.52	4
Follow-up of innovation in products and services	20	47	34.38	6.39	5

The third objective: Identifying correlation between evaluation the green marketing and encouraging to environment friend products and each of the following independent variables:

Results of statistical analysis showed the correlational relations between variables (field of the agriculture extension, type of the certificate; period of the service in office; office degree, finally activities of the participation agriculture techniques) and the respondents' evaluation of applying green marketing as shown in table No. (2). it is showing us that there are significant correlation at level (0.01 and 0.05) in sequence between evaluating the role of agricultural extension in applying green marketing and encouraging to environment friend products in Nineveh Governorate and each of: (office degree, type of certificate, activities of participation agriculture) then this due to fact that more higher of employee's office degree due to more positive toward encouraging to environment friend products, green, because of increase in awareness in this area ,and higher certificate due to more awareness and lastly apply green market & encourage environment friend products ,and larger of activities to the participation agriculture techniques mean higher of the level may because need of more labors to apply these green market & encourage environment friend products.

While variables (field of the agriculture extension; period of the service in office) there were no significant correlation at level significance 0.05 with agricultural extension in applying green marketing and encouraging to environment friend products in Nineveh Governorate.

Table (4) Distribution of employees according to the research variables

No	Variable	Categories of evaluation	Frequencies	Ratio	Spearman's correlation & Pearson's simple	Sig. level
1	office degree	agricultural engineer assistant	15	21.12	0.51	0.01**
		Agricultural engineer	17	23.94		
		Oldest agricultural engineer	18	25.35		
		Engineers president assistant	10	14.08		
		Engineers president	11	15.49		
		Total Summation	71	%100		
2	type of certificate	Primary	8	11.26	0.25	0.05*
		Intermedia	11	15.49		
		Preparatory school	14	19.71		
		Institute	18	25.35		
		Collage	18	25.35		
		High certificate	2	2.81		
		Total Summation	71	%100		
3	period of service in office	Few (3-14) years	32	45.07	0.128	0.358 N.S
		Median (15-26) years	14	19.71		
		Big (27&more)years	25	35.21		
		Total Summation	71	%100		
4	field of extension	Agriculture	56	78.87	-0.187	0.175 NS
		Non-Agriculture	15	21.12		
		Total Summation	71	%100		
5	activities of participation agriculture	Absence activities(0)	9	12.67	-0.339	0.012*
		Small (1-3) degree	10	14.08		
		Medium range (4-6) degree	28	39.43		
		Large (7-8 and more) degree	24	33.80		
		Total Summation	71	%100		

** =0.01 * =0.05 N. S=No Significant

1-office degree: Staff of Ninawa agriculture moderate distributed in five classes 1- agricultural engineer assistant 2- oldest agricultural engineer 3- engineer president assistant 4-engineers president 5-oldest engineers president, affording to the office degree, showed that; ratio percentage in first class 21.12 % second class 23.94 % third class 25.35 % fourth class 14.08 % and finally five class 15.49 %, it is a significant correlation between evaluation the role of agricultural extension in applying green marketing and encouraging to environment friend products with office , 0.51 value of Calculated r test ; at level (1%); then (t) test was used, & its value was (4.17), when compared with (t) table; it was found to be significant at level (0.05); & thus rejecting the statistical hypothesis, this may be due to fact that, more employees were gain high office degree , their evaluation level increased; and thus their office degree with most important operations increased too. this result dissimilarity with the hypothesis of research putted, this result agreement with study of (Al-Hamdany and etal. ,2024) and (El-Boraey,2021)

2- type of certificate: Staff were classified according to their type of certificate level, into 7 categories, as shown in table (2). Results show that (11.26 %) of the respondents are Primary, the percentage of Intermedia graduates

is (15.49%), the percentage of Preparatory school graduates is (19.71%); the percentage of institute and college graduates is (25.35 %) of each one, while the percentage of Higher Certificate is (2.81%).When testing the statistical hypothesis , that states (there is a significant correlation between the evaluation level of agricultural staffs and type of certificate at level 5%)this result agreement with study of (Kadem,2025), value of Spearman's rank correlation coefficient reached 0. 25, then (t) test was used its value was (3.92), when compared with (t) table; it was found to be significant at level (0.05) thus rejecting statistical hypothesis; this may be due to that; more employees were gain high type of certificate, their evaluation level increased; and thus their office degree with most important operations had been increased too, which is a significant at probability level 0.05. however; the null hypothesis is refused; and the alternative hypothesis, is accepted, the reason of that may, be that the employees when they take scientific certificate then reflect that to their awareness and their role in applying of green marketing as well as diffusion it in Ninevah province.

3- period of service in office: Employees were classified according to, their period of service in office, into three categories; first category includes employees who have few period of service in office (3-14) years and their percentage was (45.07%); while second category includes employees who have median period (15-26) years of service in office their percentage was (19.71%), while third category includes employees who have big period (27&more)years of service in office ,and their percentage was (35.21%),when testing statistical hypothesis, that states (there is, no significant correlation between evaluation the green marketing and encouraging to environment friend products and their period of service in office); it was found that, there wasn't a significant correlation between two variables ; according to the value of the correlation coefficient reached (0.128),this result disagreement with (Hameed and etal ,2025).

4-field of extension: Employees were classified into two categories, first category includes employees who works in their fields & their percentage was (78.87%); while second category includes employees who work in another field, and their percentage was (21.12%).Then when testing a statistical hypothesis which states that (there is no a significant correlation between evaluation the green marketing and encouraging to environment friend products and their field of work);it was found that it isn't a significant correlation between the two variables at probability level (0.05), where value of correlation coefficient reached (-0.187), therefore we accept the null hypothesis & reject alternative hypothesis; which indicates that there is no relationship between applying the green marketing and encouraging to environment friend products and their field of work .

5- activities of participation agriculture: The employees were classified according to this factor into employees; who were exposed to the extension activities with Small (1-3) degree in activities of participation agriculture; then they represented (26.76%),and the second category included respondents who were exposed to extension activities with Medium range (4-6) degree, they represented (39.43%); and the third category included respondents who were exposed to extension activities with large range (7-8 and more) degree, they represented (33.80 %); and as shown in table above, it is clear from the table that their activities is medium tend to large . Find the correlation between the level of evaluation the green marketing and encouraging to environment friend products and their activities; simple correlation coefficient, was used and its value was (-0.339), that indicating, existence of a negative relationship between the two variables. Then (t) test was used; and its value was (3.67), when compared with (t) table; it was found to be significant at level (0.05), and thus rejecting the statistical hypothesis, this may be due to fact that, more respondents were exposed to the activities; their evaluation level increased; and thus their experience with most important operations increased too.

Table (5) Distribution of employees according to involvement in extension activities

No	Extension activities	Yes	No
1	Visiting an agricultural extension	21	1
2	attending extension seminar	10	2
3	attending extension meeting	12	3
4	read Extension magazines	15	1
5	listening to TV. & Radio program	13	2
6	Participating in special training course regard with serving green marketing fields	0	0
Total		62	9

CONCLUSIONS

Concern about evaluating applying green marketing techniques; was not at an acceptable level; there is a big significant need to enhance the efforts towards these techniques through producing awareness with new information to reduce agricultural risk & mitigate and application true procedures to conservation the environment , also can be judged using various research methods & variables, these include surveys; interviews; focus group discussions; and direct observation of employees' practices in their plants, key variables to measure include employees' familiarity with applying green marketing techniques; awareness of green marketing varieties; understanding of market trends with careful to natural resources carefully and without hurt it and exhaustibility; & engagement with office degree and type of certificate and activities of participation agriculture to improve employees' applying green marketing techniques ; targeted training & education programs can be implemented; that along with provision of activities of participation agriculture, this can be helped employees adopt new smart green marketing farming technologies; implement a good agricultural practice; & improve their an overall productivity & sustainability , in conclusion; the level of employees' activities of participation agriculture plant services is very crucial for success of green marketing farming industry, by conducting comprehensive research & implementing targeted interventions; it is possible to enhance employees' applying the green marketing; ultimately leading to improve the productivity & profitability in this sector.

Recommendations

- 1- Increasing support marketing policies to achievement sustainable development in the agricultural sector particular in the research region and Iraq in general.
- 2- Foster learning of farmer-to-farmer by meetings finally to other farmer can use demonstrations to achieve more effective in promoting improvements in the agricultural practices.
- 3- Leverage social networks to increase diffusion of green marketing and best practices among the farmers, this can involve using online platforms; community groups;& other media to facilitate information sharing & collaboration among the farmers .
- 4- Encouraging employees to involvement farmer's engagement at the planning & implementation of extension programs; for ensuring their needs & interests be addressed, this can be helped to build trust & increase the effectiveness of extension services.
- 5- Provide training on the sustainable & profitable practices, can help them to overcome behavioural biases; such as procrastination; also adopt new technologies

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