



## **Valuation of Extension Officer's Attitudes towards Organic Farming, Khartoum State, Sudan**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Authors AEMA and KAYA joined the idea and designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author MAAH managed the analyses of the study and managed the literature searches and wrote final protocol. Author EKHK joined designed the study and managed the literature searches. All authors read and approved the final manuscript.*

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### **ABSTRACT**

Organic farming is widely used in the world. It is known by its low cost, high yield, high income, and food safety. The aim of this paper was to assess the extension officer's attitude towards organic farming in Khartoum State. A sample size of 40 extension officers was selected for this paper by using full account sampling technique. A close-ended questionnaire was constructed and used for data collection. The collected data were coded and statistically analyzed by using SPSS, discussed, interpreted using descriptive analysis. The attitudes of extension officers were measured according to Likert scale. Results showed that the extension officers in Khartoum State had a positive attitude towards organic farming. The results indicated the extension officers were use 62.5% T.V, 65% radio and Internet, and 57.5% extension periodicals as information source. Also 87.5% of extension officers stated that the organic farming can contribute widely in national economy and rural development and 85% confirm that Sudan in need for organic farming. Result of Likert scale measurement showed that extension officers have a positive attitude towards all parameter measured. The results of correlation coefficient depicted that the relationship between some parameter measured showed positive moderate ( $r = .255$ ), ( $r = .359^*$ ), and ( $r = .302$ ). It can be concluded that organic farming in the study area is well accepted by extension officers and promised. The study recommended that the government has to play an important role to support organic farming through policy development and to support research. The extension officers should be subjected to frequent training programs in organic farming.

**Keywords:** *Valuation; extension attitude; organic farming; Khartoum.*

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## 1. INTRODUCTION

Today's agricultural systems are heavily dependent on chemical inputs [1] and there have been widespread environmental negative outcomes associated with the increasing application of synthetic chemicals, including the contamination of soil and water supplies, a proliferation of pests and novel types of plant diseases, malnutrition and a decrease in the food supplies quality [2]. The combination of these factors mean that the environmental care and the health and safety of food supplies could become one of the most significant issues of the day and has made international human communities try to find solutions to face these issues and achieve sustainable agricultural systems [3]. A new trend and attention towards adopting organic farming in the developing countries [4]. Organic farming is a solution that addresses the issues of the deleterious effects of chemical [5] and is increasingly accepted by countries and different international organizations of the world. Many countries are interested in organic farming system and organic products to avoid environmental contaminations and to foster health [6]. Organic farming seem to be alternative source using in Sudan and offering opportunities to become involved in market development program [7]. Organic agriculture is a production system which excludes application of synthetic fertilizers, synthetic chemical pesticides, herbicides, and fungicides, and advocates composting, crop rotation, fallow rests, and biological controls to maintain the equilibrium. The main purpose of these methods is to create a production system which forms a constructive, appropriate equilibrium among the human, soils, plants and animals in the system and does not have any contradiction with the human and environmental interests [8]. Most of the organic farming activities like the use of nitrogen stabilizer plants, returning agricultural wastes to the soil, and application of covering plants would result in an enhancement of return of carbon to the soil and would help preserve and storing it in the soil. Despite the advantages of organic farming, statistics show that the international rate of application of chemical fertilizers has more than doubled between 1950 and 1996 [9].

Some studies have indicated that those who have implemented organic farming have been complaining about the negative attitude of the extension experts toward organic farming and

their lack of knowledge and they have even mentioned that these experts had been frustrating other farmers in their uptake of organic farming practices [10].

Generally it can be regarded that one's activities in any field are the manifestation of one's attitudes toward it and these attitudes consist of a combination of complex beliefs, motivations and experiences [11]. In recent years, global awareness of health and environmental issues has been growing. Sustainability has become the key word in discussions in economic development, particularly in relation to developing countries. The ever growing number of health and environmentally concerned consumers, mainly in the industrialized countries of Western Europe, North America, Japan and Australia, were at the root of this development. The international community is becoming more and more conscious of these issues. Government policies in industrialized as well as developing countries increasingly encourage organic and other forms of sustainable agriculture [12]. The sustainability of both agriculture and the environment is a key policy of today's Common Agriculture Policy (CAP). Sustainable development must encompass food production alongside conservation of finite resources and protection of the natural environment so that the needs of people living today can be met without compromising the ability of future generations to meet their own needs [12]. Interest in organic agriculture and its products has widely grown in the world, mainly due to the increasing environmental and health hazards associated with the intensive use of chemicals in agriculture. Sudan, in spite of its high potential of organic agricultural production along the shores of the Nile, rivers, and the seasonal streams, has not been able to widely invest in organic production. Over the last years, the paradigm of organic agriculture as a sustainable mode of production has strongly grown among the Sudanese community. Furthermore, the importance of this type of production is progressively increasing amongst researchers, as well as policy makers as a good sign for a healthy thinking lead to take serious steps toward organic production in all the states of Sudan especially Khartoum State as a horticultural state and where the Capital of Sudan [13]. An attitude can be identified as a tendency to answer to an idea or situation in a particular way which is mostly considered as a concept to guide individual's behavior [6].

## 2. MATERIALS AND METHODS

### 2.1 Area of the Study

Khartoum State is located in the Semi-desert region between latitude 15°33`N, and longitude 32°31`E with a total area of about 20971 square kilometers about 5 million acres, population density of 5.5 million with a growth rate of 3.7%. The arable land about 1.8 million acres and the invested area about 700 thousand acres on three Seasons summer, followed by autumn and winter suitable for cultivation of various crops including fruits, vegetables and fodder, etc. by application of irrigation from the Nile or underground water reservoir and rain water.

### 2.2 Population and Sample Size

The total number of agricultural extension officers working for Agricultural Extension and Technology transfer Administration in Khartoum State is estimated to be 40 agricultural extension officers. This number represents the sample size of the study.

### 2.3 Data Collection

Primary data is collected by questionnaire designed specially to collect the needed data consisting 27 questions was constructed addressed selected personal characteristics of extension officers in Khartoum state, source of agricultural information, attitude statement, while secondary data is collected from publications and previous studies in order to get in deep information on organic agriculture in general and organic agriculture in the Sudan in particular.

### 2.4 Data Analysis

The collected data were coded, fed to computer and statistically analyzed using Statistical Packages for Social Sciences (SPSS), discussed interpreted using percentage, frequency Distribution. The attitudes were measured by likert scale measurement and weighted mean, to examine the relationship between extension officers personal characteristics and their attitude towards organic farming correlation coefficient was used.

$$\bar{X} = T_15 = T_24 = T_33 = T_42 = T_51 / n$$

Where:

$\bar{X}$  = Weighted mean

T<sub>1</sub>= frequency of paragraphs strongly agree.

T<sub>2</sub>= frequency of paragraphs agree.

T<sub>3</sub>=frequency of paragraphs neutral.

T<sub>4</sub>=frequency of paragraphs disagree.

T<sub>5</sub>=frequency of paragraphs strongly disagree.

n = number of individuals sample size.

Source: [14,15]

## 3. RESULTS AND DISCUSSION

Table 1 showed that 85% of the extension officers were young people between 25-35 years old. This means that young ones will lead agricultural work in the future, and had more physical effort for work and facilitate better communication between researchers, extension workers and their farmer clients to transfer technologies and information more cost effectively [16]. In addition to 52.5% of the extension officers are males, while 47.5% are females. This result reflects that there is no gender problem in recruiting extension officers, and no social problem for female extension officers to work with their male's colleagues. Also 55% of the extension officers reported that are bachelor holders and 7.5%, 37.5% they are secondary school and master degree holders respectively, educational level contribute directly on job performance, and more educated ones can do better than others. The majority of the extension officers 62.5% are married. while 37.5% of them not married. Research has shown that married people have more stability which will add to their jobs performance, and their enthusiasm in their work [17]. The results depicted that 62.5% of the respondents their work experiences between 5-10 years, 17.5% their work experiences between 11-15 years, 7.5% their work experiences between 16-20 year and 12.5% their work experiences 21 year and more. The more work experience is essential for extension personnel; it will increase their knowledge, skills, and years of experience help in a good management and well acting in extension work.

The results in Table 2 showed that 62.5% and 65% of the extension officers were sometimes use T.V and radio as information source. T.V and radio it represent the old sources of accessing information in Sudan [18] and no broad agricultural channel in Sudan T.V or any other local agricultural channels. also 65% of the extension officers were always using internet as information source. This is because internet services are available in Khartoum state it

perceived that low communication cost and availability of valuable information [19]. Only 42.5% of them depend on scientific magazines as information source, for the case that scientific magazines not always available for them and most of them not always contact with scientific institutions. The results extend to revealed that 57.5% of the extension officers were always use extension periodicals as information source this due to the fact that all the extension officers employed regularly with the department of agricultural extension that belong to federal

ministry of agriculture. Access to information from any source increases the performance of extension officer and did his duties effectively [20].

The results in Table 3 showed that 57.5% of the extension officers were trained in organic farming. While 42.5% of them were not trained in organic farming, because organic farming is considered as a new technology in Sudan, and the department of agricultural extension not fully adopted this technique in its programs.

**Table 1. Distribution of the extension officers according to their demographic characteristics**

Demographic characteristics		Frequency	Percent %
Age	25-35	34	85.0
	36-45	3	7.5
	46-55	3	7.5
Sex	Male	21	52.5
	Female	19	47.5
Education	Secondary	3	7.5
	University	22	55
	above university	15	37.5
Social status	Unmarried	15	37.5
	Married	25	62.5
Experience	5-10 years	25	62.5
	11-15 years	7	17.5
	16-20 years	3	7.5
	21 and more	5	12.5
Total		40	100

**Table 2. Information source for the extension officers**

Information source		Frequency	Percent%
Use of T.V	Always	6	15
	Sometimes	25	62.5
	Rare	5	12.5
	Not at all	4	10
Use of Internet	Always	26	65
	Sometimes	10	25
	Rare	2	5
	Not at all	1	2.5
Use of scientific magazine	Always	9	22
	Sometimes	17	42.5
	Rare	10	25
	Not at all	4	10
Use of Extension periodical	Always	23	57.5
	Sometimes	12	30
	Rare	4	10
	Not at all	1	2.5
Use of radio	Always	5	12.5
	Sometimes	5	12.5
	Rare	4	10
	Not at all	26	65
Total		40	100

**Table 3. Distribution of the extension officers according to their accessed to training in organic farming**

Training in organic farming	Frequency	Percent%
Trained	23	57.5
Not trained	17	42.5
Total	40	100.0

**Table 4. Perception of the extension officers towards organic farming**

		Frequency	Percent%
Acceptance of organic farming	Accepted	38	95.0
	Neutral	2	5.0
Contribution in national economy	Contribute	35	87.5
	Not contribute	5	12.5
Contribute on rural development	Contribute	35	87.5
	Not Contribute	5	12.5
Decreases the production cost	Decreases	28	70.0
	Not decreases	12	30.0
Sudan need organic farming	Need	34	85.0
	Not need	6	15.0
Government encouraging efforts of organic farming	Encourage	9	22.5
	Not encourage	31	77.5
Total		40	100

The results in Table 4 showed that most of the extension officers (95%) accepted organic farming in their field of work and 5% of them are neutral, this because most of them know very well the benefits of organic farming and important of it when reflected on the human health, and well known the hazards that created by using of nonorganic substances in agricultural processes. Also majority of the extension officers (87.5%) reported that the organic farming can contribute widely in national economy and rural development. This indicates that the organic farming can contribute in national economy especially in case of exported agricultural products through increase the purchasing power of the organic products, and hence increase the net income of their natural agricultural products.

On the other hand where the extension officers were asked about the effect of organic farming on the environment and consumers health, all of them reported that organic farming protect the environment and consumers health from hazards caused by the using of chemical inputs in non-organic agriculture. The result extend to indicated that 70% of the extension officers stated that the organic farming decreases the production cost due to reduce cost of chemical pesticides and chemical fertilizers of the total cost of production, and this can be substitute by low price local fertilizers and by adopting of biological control. In addition to 85% and 77.5%

of extension officers confirm the Sudan in need for organic farming and the government encouraging the organic farming respectively.

All the extension officers reported that the agricultural extension have a role in development of organic farming, because extension work with farmers in their fields and houses is one of the main roles of extension in diffusion of innovations between farmers, and organic farming is one of these innovations that should be diffused between farmers. Here the government represented by agricultural extension.

The results in Table 5 showed that 30%, 35%, 20%, 12.5%, 2.5% of extension officers reported that the organic farming has less complications than traditional farming, respectively strongly agree, agree, to some extent, disagree, strongly disagree.

Extension officers have a positive attitude towards complications of organic farming at weighted mean of (3.77) according to Likert scale measurement.

The results in Table 6 showed that majority of the extension officers (82.5%) noted strongly agree that the extension program are important to diffuse the organic farming technique. while 17.5% of them agree.

**Table 5. Extension officer's attitude towards complications of organic farming**

<b>Organic farming less complication</b>	<b>Frequency</b>	<b>Percent%</b>	<b>Weighted mean</b>
Strongly agree	12	30.0	3.77
Agree	14	35.0	
To some extent	8	20.0	
Disagree	5	12.5	
Strongly disagree	1	2.5	
Total	40	100.0	

**Table 6. Extension officer's attitude towards importance of extension programs in diffusion of organic farming**

<b>Importance of extension program</b>	<b>Frequency</b>	<b>Percent%</b>	<b>Weighted mean</b>
Strongly agree	33	82.5	4.82
Agree	7	17.5	
Total	40	100.0	

**Table 7. Attitude of extension officers towards exclusive use of pesticides affects farmers health**

<b>Exclusive use of pesticides affects farmers health</b>	<b>Frequency</b>	<b>Percent %</b>	<b>Weighted mean</b>
Strongly agree	35	87.5	4.55
Agree	4	10.0	
Strongly disagree	1	2.5	
Total	40	100.0	

Extension officers have a positive attitude towards extension program is important in diffusing organic farming at weighted mean of (4.82) according to Likert scale measurement.

The results in Table 7 shows that majority of the extension officers (87.5%) strongly agree that the excessive use of pesticides effects negatively farmers health. While 10% agree and 2.5 strongly disagree.

Extension officers have positive attitude towards exclusive use of pesticides effect farmer health negatively, at weighted mean of (4.55) according to Likert scale measurement.

The results in Table 8 showed that majority of the extension officers (70%) strongly agree with that organic farming increases the soil fertility. While

22.5%, 2.5%, 5% respectively agree, to some extent and disagree.

Extension officers have a positive attitude towards organic farming increases soil fertility, at weighted mean of (4.57) according to Likert scale measurement.

The results in Table 9 indicated that 25%, 35%, 37.5%, and 2.5% of the extension officers reported that the adoption of organic farming very weak because the farmers were not know it, respectively strongly agree, agree, to some extent, disagree.

Extension officers have a positive attitude towards the weak adoption of organic farming because farmers have no enough information about it, at weighted mean of (3.82) according to Likert scale measurement.

**Table 8. Attitude of extension officers towards organic farming increases soil fertility**

<b>Organic farming increases soil fertility</b>	<b>Frequency</b>	<b>Percent %</b>	<b>Weighted mean</b>
Strongly agree	28	70.0	4.57
Agree	9	22.5	
to some extent	1	2.5	
Disagree	2	5.0	
Total	40	100.0	

**Table 9. Attitude of extension officers towards weak adoption of organic farming**

<b>Adoption of organic farming is weak</b>	<b>Frequency</b>	<b>Percent %</b>	<b>Weighted mean</b>
Strongly agree	10	25.0	
Agree	14	35.0	
To some extent	15	37.5	3.82
Disagree	1	2.5	
Total	40	100.0	

**Table 10. Attitude of extension officers towards saving of natural resources by the adoption of organic farming**

<b>Adoption of organic farming saves natural resources</b>	<b>Frequency</b>	<b>Percent %</b>	<b>Weighted mean</b>
Strongly agree	26	65.0	
Agree	13	32.5	4.62
To some extent	1	2.5	
Total	40	100.0	

**Table 11. Attitude of extension officers towards organic farming limits the use of chemical fertilizers**

<b>Organic farming limits the use of chemical fertilizers</b>	<b>Frequency</b>	<b>Percent %</b>	<b>Weighted mean</b>
Strongly agree	27	67.5	
Agree	9	22.5	4.57
To some extent	4	10.0	
Total	40	100.0	

The results in Table 10 showed that majority of extension officers (65%) reported they strongly agree with the statement that organic agriculture saves the natural resources from depletion. While 32.5%, and 2.5% respectively agree, to some extent.

Extension officers have a positive attitude towards organic farming saves natural resource from depletion, at weighted mean of (4.62) according to Likert scale measurement.

The results in Table 11 showed that most (67.5%) of the extension officers strongly agree that the organic agriculture limits the use of the chemical fertilizers, only 22.5% agree, and 10% to some extent.

Extension officers have a positive attitude towards organic farming limits the use of chemical fertilizers, at weighted mean of (4.57) according to Likert scale measurement.

Table 12 showed that 20%, 10%, 35%, 30%, and 5% of extension officers reported that the implementation of the organic agriculture is difficult because the availability of the organic resources is uneasy respectively strongly agree, agree, to some extent, disagree, strongly disagree.

Extension officers have neutral attitude towards organic farming is difficult to implement due to scarce availability of organic matters at weighted mean of (3.1) according to Likert scale measurement.

**Table 12. Attitude of extension officers towards availability of organic matter**

<b>Availability of organic matter is difficult</b>	<b>Frequency</b>	<b>Percent %</b>	<b>Weighted mean</b>
Strongly agree	8	20.0	
Agree	4	10.0	
To some extent	14	35.0	3.1
Disagree	12	30.0	
Strongly disagree	2	5.0	
Total	40	100.0	

**Table 13. Attitude of extension officers towards marketing of organic products**

<b>Marketing of organic products is easy</b>	<b>Frequency</b>	<b>Percent %</b>	<b>Weighted mean</b>
Strongly agree	9	22.5	
Agree	9	22.5	
To some extent	14	35.0	3.45
Disagree	7	17.5	
Strongly disagree	1	2.5	
Total	40	100.0	

**Table 14. Attitude of extension officers towards decreasing the cost of production by organic farming**

<b>Organic farming decreases cost of production</b>	<b>Frequency</b>	<b>Percent %</b>	<b>Weighted mean</b>
Strongly agree	16	40.0	
Agree	10	25.0	
To some extent	8	20.0	3.85
Disagree	4	10.0	
Strongly disagree	2	5.0	
Total	40	100.0	

The extension officers reported that 22.5%, 22.5%, 35.5% and 17.5% marketing of organic products very easy respectively strongly agree, agree, to some extent, disagree, strongly disagree, Table 13.

Extension officers have a positive attitude towards marketing of organic products is easy, at weighted mean of (3.45) according to Likert scale measurement.

The extension officers reported that the organic agriculture decreases the cost of production due to the use of organic inputs. 40%, 25%, 20%, 10%, and 5.0% of respectively strongly agree, agree, to some extent, disagree, strongly disagree, Table 14.

Extension officers have a positive attitude towards organic farming decreases production

cost due to the use of organic inputs, at weighted mean of (3.85) according to Likert scale measurement.

The results in Table 15 showed that majority of the extension officers (95%) reported that strongly agree that the organic farming saving healthy food, while 5% agree with them.

Extension officers have positive attitude towards organic farming saving healthy food at weighted mean of (4.95) according to Likert scale measurement.

Table 16 showed that 32.5%, 12.5% and 45% of the extension officers reported that the organic farming more profitable respectively strongly agree, agree, to some extent, while only 10% disagree.

**Table 15. Attitude of extension officers towards organic agriculture saving healthy food**

<b>Organic farming giving healthy food</b>	<b>Frequency</b>	<b>Percent %</b>	<b>Weighted mean</b>
Strongly agree	38	95.0	
Agree	2	5.0	4.95
Total	40	100.0	

**Table 16. Attitude of extension officers towards organic agriculture profitability**

<b>Organic farming profitable</b>	<b>Frequency</b>	<b>Percent %</b>	<b>Weighted mean</b>
Strongly agree	13	32.5	
Agree	5	12.5	
To some extent	18	45.0	3.67
Disagree	4	10.0	
Total	40	100.0	

**Table 17. Spearman correlation matrix of relationship between extension officer's personal characteristics and their attitudes towards organic farming**

Variables	Attitudes
Age	.255
Level of education	-.054
Work experience	.025
TV	.359*
Internet	-.002
Scientific magazine	.060
Extension publications	.021
Radio	.302

Extension officers have a positive attitude towards organic farming is being more profitable than conventional farming, at weighted mean of (3.67) according to Likert scale measurement.

With reference to the Daivse convention for interpreting correlation coefficient, the result shows that the relationship between extension officers age and their attitude towards organic farming is positive negligible ( $r = .255$ ). It means that increase in extension officers age leads to positive increase in their attitudes towards organic farming. The results also found negative negligible relationship ( $r = -.054$ ) between extension officers level of education and their attitudes towards organic farming (Table (17)). This corroborates with the study of [21] who reported that level of education of extension officers didn't affect their attitudes towards organic farming.

There is a positive negligible relationship ( $r = 0.25$ ) between extension officers work experiences and their attitudes towards organic farming. This result somehow agrees with the findings of [22] that professionals with increased work experiences were more likely to think favorable about organic farming. There is a positive moderate ( $r = .359^*$ ) relationship between extension officers use T.V and their attitudes toward organic farming. The relationship between extension officers use internet and their attitudes toward organic farming is negative negligible ( $r = -.002$ ). The relationship between extension officers use of scientific magazines and their attitudes toward organic farming is positive negligible ( $r = 0.060$ ). There is a positive negligible ( $r = .021$ ) relationship between extension officers depend on extension publications and their attitudes toward organic farming. The relationship between extension officers depend on radio and their attitudes toward organic farming is positive moderate ( $r = .302$ ).

#### 4. CONCLUSION AND RECOMMENDATIONS

The extension officers in Khartoum state have a positive attitude toward organic farming, age of extension officers have positive negligible relationship with their attitudes towards organic farming, level of education of extension officers have a negative negligible relationship with their attitudes towards organic farming, work experiences of extension officers have a positive negligible relationship with their attitudes towards organic farming. The paper recommends that the government can play an important role to supporting organic farming through development policy to support research and marketing, institutions for training in organic farming should be established, the extension officers should be provided with different types of training programs related to the organic farming, and more studies should be conducted among agricultural extension officers in the different agricultural agencies in Sudan to investigate their philosophy, attitude, perception, and knowledge regarding organic farming.

#### DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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