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Assessing the Student's Attitudes Towards Sustainable Agriculture

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Abstract: Students are the agriculturist of tomorrow; therefore policies aimed at developing sustainable agriculture should address the needs of this group. To discover their attitudes towards sustainable agriculture, a survey among 100 agricultural students was conducted. Questionnaire was used to examine student attitudes regarding sustainable agriculture. Finding is shown that students' attitudes towards sustainable agriculture are positive, especially in cognitive aspect. In conclusion, to enhance student attitudes towards sustainable behavior in agriculture context, it is important that curriculum develops for familiar student with sustainable agriculture practices and concepts such as: integrated pest management, low-input agriculture, rotational grazing, ecological agriculture, waste management, organic farming and alternative agriculture as to meet the needs of students preparing to enter the work force of the 21st century food and fiber system.

Key words: Attitude · sustainable agriculture · student · factor analysis

INTRODUCTION

Concerns about the negative impact conventional agriculture is having on the environment have propelled the call for farming practices that are not only economically sound but also environmentally protective and socially acceptable. Agricultural professionals (researchers, educators, students and farmers) believe that the agricultural systems advocated by sustainable agriculture have great potential for addressing these concerns [1]. Sustainable agriculture requires a long term perspective and continuing activities over several generations. Therefore, performance and behavior of current agricultural students as agriculturist and professionals will ensure the sustainability of agriculture in the future. In this context, since attitudes, norm and value are important determinants of human behaviors and performance, in long run; attitudes become especially important because they provide direction and purpose to behaviors and performance [2] thus, a better understanding of students' attitudes of sustainable agriculture would aid the development of teaching and learning initiatives in this area purposely. Regarding to this subject, this study was designed to answer the following questions:

- How are the attitudes of students toward Sustainable agriculture?
- What are the most important components of the attitudes of students toward Sustainable agriculture?

Theatrical framework: Sustainability is a concept increasingly used in reference to economic performance, of human activities and actions that affect not just the present but also the future generation, such as farming, logging and mining, in relationship to the environment. Following the most, general definition, an economic activity is considered sustainable if it could be carried out indefinitely [3]. The world sustainable is derived from the Latin, sustinere to keep in existence, implying permanence or long-term support. In context of agricultural production, Ikerd [4] defines a sustainable agriculture as:

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capable of maintaining its productivity and usefulness to society over the long run... it must be environmental-sound, resource-conserving, economically viable and socially supportive and commercially competitive [5]. But, is sustainable agriculture a philosophy, a system of farming or a management strategy? It has been called all three and each term adds a perspective which helps explain the complexity of this multi-dimensional concept. From the difficulties evident in gaining a consensus on the definition, it is obvious the term has different meanings for different people [6]. For example, the American Society of Agronomy defines sustainable agriculture as one that, over the long term: (1) enhances environmental quality and the resource base on which agriculture depends, (2) provides for basic human food and fiber needs, (3) is economically viable and (4) enhances the quality of life for farmers and society as a whole. To some, sustainable agriculture is more of a goal, although others see it as practices; however, most do agree that future agricultural systems should be economically sound, environmentally protective and socially acceptable [7]. Fretz [8] stated that sustainable agriculture emerged as an overarching and interconnected framework of technologies, practices and systems developed in response to the problems facing agriculture. Who stated that components of sustainable agriculture are found in the ...concepts that underlie integrated pest management, low-input sustainable agriculture, rotational grazing, ecological agriculture, waste management, organic farming and alternative agriculture by taking and adapting something from these technologies, we are defining sustainable agriculture. The underlying principle of each of these components' parts is that of management by thinking rather than by doing [8]. Brady [9] stated that: "There is a growing awareness that agricultural systems must provide not only what humanity needs today but what the human family will require a decade or even a century from now. Sustainable agriculture is a topic whose time has come (p. 104)."After studying the writings of others, Firebaugh [10] proposed that the goals of sustainable agriculture are to: (1) maintain or improve the natural resources base, (2) protect the environment, (3) ensure profitability, (4) conserve energy, (5) increase productivity, (6) improve food quality and safety and (7) create more viable socioeconomic infrastructure for farms and rural communities. The theoretical basis for this study has its foundation in the work of Fishbein and Ajzen [11]. As adapted to this research, known of students' attitudes toward sustainable agriculture will, theoretically, provide an indication of their interests in pursuing sustainable agriculture as a field of study and professional pursuit. According to traditional perception, attitudes consist of different: cognitive, effective and cognitive. A cognitive component includes the knowledge of and belief about the attitude object. Feelings towards the attitude object are, in turn, included in an affective component, whereas behavioral tendencies, intentions and actions with respect to attitude object are included in a conative component. Ajzen and Fishbein [12] interpret these components as being different categories of activates that reflect attitudes. Thus, the distinction to cognitive, affective and conative components is only way of classifying the actions that reflect attitudes [2].

MATERIALS AND METHODS

The population identified to participate in this study was students in Agricultural College of University of Tehran. A sampling formula indicated that a total of 120 subjects should be sampled from the population. A total of 120 students were randomly selected to represent the population. The subjects thus identified were sent a mailed survey. Of this sample, 99 responded as the result of the original mailing and follow-up mailing. A response rate of.82% was obtained. The panel of experts (experts, students and teachers) was used for assuring content validity. The instrument was pilot tested for clarity and reliability, using agriculture students from University of Tehran. The Cronbach's Alpha coefficient of internal consistency for the items measuring the students' perceptions toward sustainable agriculture was 0.72. According to Hair *et al.* [13], the commonly used coefficients limiting value of acceptable reliability is 0.7. Basis on data in this research, this indicator can be considered relatively reliable in measuring student's attitudes towards sustainable agriculture. Minor revisions were made to the questionnaire to improve clarity and the internal consistency of the instrument. The instrument assessed the agriculture students' (a) perceptions toward sustainable agriculture practices and (b) degree of usage of information sources and communication channel about sustainable agriculture. Attitude was categorized with a score of 1 graded as negative attitude until 10 positive, to measure students' perceptions on 16 items related to sustainable agriculture that developed by Aderemi *et al.* [1] and was updated and used in this study. Analyses of data were accomplished using factor analysis. Factor analysis was utilized to reveal the latent attitudes behind the student's opinions. A.05 level of significance was selected. The results that follow are based on the

response to the survey. The appropriateness of the data for factor analysis was evaluated using Bartlett's Test of Sphericity (BTS).

RESULTS

Demographic characteristics: The 99 students responding, 86.9% were male, 13.1 were female; the average age of the respondents was 24.86 years; 76.8% had between 1 and 5 years farming backgrounds; 35.5% were student of bachelor level; 38.4.6% were students of master of science level; and 26.4 2% were Ph.D students at Tehran university.

Attitudes regarding to sustainable agriculture: To determine the attitude of the respondents with regard to sustainable agriculture, attitude was categorized with a score of =?41 graded as negative attitude or unfavorable, 41-53 moderately positive or neutral and = 53.1 positive or favorable. The results in Table 1 indicated that a majority of the respondents, 74.7.0%, had a favorable attitude towards sustainable agriculture, with 22.2.8% having a moderately positive attitude and only 3% having a negative attitude.

Factor analysis: Bartlett's Test of Sphericity (BTS = 351.51, $p<0.000$) suggests that the bivariate correlations among the scale items are significantly different from zero and therefore appropriate for factor analysis. Further, the sampling adequacy, as evaluated by Kaiser's Measure of Sampling Adequacy, appears to be acceptable at a value of.622.

The Table 2 shows all the factors extractable from the analysis along with their Eigen values, the percent of variance attributable to each factor and the cumulative variance of the factor and the previous factors. As the results indicate that there are 6 factors to measure the construct of attitudes towards Sustainable Agriculture (SA) about 66.01 percent the variance that the first factor accounts for 13.371% of the variance, the second 13.34%, the third 10.76%, the fourth 7.53%, the fifth 9.98 and the sixth 9.091.

Table 2 also shows the loadings of the eight variables on the six factors extracted. The higher the absolute value of the loading, the more the factor contributes to the variable. The gap on the table represent loadings that are less than 0.35, this makes reading the table easier. We suppressed all loadings less than 0.35. According with Varimax Rotation matrix (Table 3), (the idea of rotation is to reduce the number factors on which the variables under investigation have high loadings. Rotation does not actually change anything but makes the interpretation of the analysis easier).

The verbal description of the factors:

Factor 1: This factor represents an attitude, which emphasizes communality and individual's responsibility to the environment. It illustrates a positive attitude towards the values of sustainable agriculture. Environmental balance is one basis for sustainable agricultural practices; advantage of sustainable agricultural practices is reduction in the use of chemical fertilizers and farmers in sustainable agriculture lives more in harmony with nature are substantially loaded on this factor.

Table 1: Summary of trichotomized attitudinal scores of students toward sustainable agriculture

Attitude score	Trichotomy	Frequency	Percent	Cumulative (%)
Unfavorable	= 41	3	3.0	3.0
Neutral	41-53	22	22.2	25.3
Favorable	> 53.1	74	74.7	100.0
Total		99	100.0	

Source: Field survey (2007)

Table 2: Total variance explained

	Extraction sums of squared loadings			Rotated component (factor) matrix		
Factor	Total	Variance (%)	Cumulative (%)	Total	Variance (%)	Cumulative (%)
Factor 1	2.832	17.700	17.700	2.139	13.371	13.371
Factor 2	2.452	15.324	33.023	2.136	13.347	26.718
Factor 3	1.845	11.533	44.556	1.723	10.769	37.487
Factor 4	1.276	7.972	52.528	1.598	9.989	47.476
Factor 5	1.136	7.099	59.627	1.511	9.444	56.921
Factor 6	1.022	6.385	66.012	1.455	9.091	66.012

Source: Field survey (2007)

Table 3: Factor analysis with varimax rotation

	Rotated component (factor) matrix						
Items	1	2	3	4	5	6	Name of factors
Environmental balance is one basis for sustainable agricultural practices	0.728						Environmental protection
An advantage of sustainable agricultural practices is reduction in the use of chemical fertilizers.	0.772						
Farmers in sustainable agriculture lives more in harmony with nature.	0.772						
Economic gains when employing sustainable agricultural practices are not convincing.		0.724					Economic
Net farm income may decrease when a producer implements sustainable agricultural practices		0.677					
Sustainable agricultural systems can improve income on a farm		0.617					
Sustainable agriculture practices would work well on any farm.			0.79				Management
Sustainable agricultural practices may require additional management beyond conventional practices.			0.57				
The adoption of sustainable agricultural practices is slow because farmers lack the knowledge to implement them			0.70				
Recommended pest control methods for sustainable agricultural systems have potential for more pests in the long term.				0.87			Sustainable agriculture practices
Sustainable agricultural practices (e.g. soil conservation, integrated pest management, decreased use of fertilizers and other chemicals, etc.) help protect the environment and our natural resources.				0.67			
There may be insufficient labor for the workload required in sustainable agricultural systems.				0.36			
Sustainable agricultural systems should produce an adequate food supply to feed the world population.					0.69		Likelihood
Recommended practices in sustainable agriculture have been embraced by mainstream agriculture.					0.75		
Adoption of sustainable agriculture practices will be easier for farmers who have both cropped and livestock enterprises.						0.71	System of sustainable agriculture
Make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls.						0.63	
Percentage variance explained	13.3	13.3	10.7	9.98	9.44	9.09	66.01

Source: Field survey (2007)

Factor 2: This factor expresses perception that sustainable agricultural systems are with some risk as net farm income may decrease, but in long term can improve income on a farm.

Factor 3: Behind this factor is the idea that sustainable agricultural systems are knowledge lad systems and require additional management beyond conventional practices.

Factor 4: Behind this factor is a perception that sustainable agricultural practices relies on soil conservation, integrated pest management, decreased use of fertilizers and other chemicals and have potential for more pests management in the long term. On the contrary, there may be insufficient labor for the workload required in sustainable agricultural systems.

Factor 5: This factor is regarding to sustainable agriculture's effect on the food supply so that sustainable agricultural systems had the ability to produce an adequate food supply to feed the world population.

Factor 6: Behind this factor is the idea that adoption of sustainable agriculture practices will be easier for farmers who have both cropped and livestock enterprises. Also it is emphasis on the efficient use of nonrenewable resources and on-farm r esources and integrates, where

appropriate, natural biological cycles and controls. Finally, according to equation: $\varepsilon_1 = w_1x_1 + w_2x_2 + \ldots w_px_p$ that $\varepsilon_1, \varepsilon_2, \ldots, \varepsilon_p$ are the principal components and $w^1, w^2 \ldots w^p$ are the weight of the variable for the principal component, factor model is as below:

$$\varepsilon_1 = 0.72x_{11} + 0.77x_{12} + 0.77_3x_3 = 13.3\%$$
$$\varepsilon_2 = 0.72x_{21} + 0.67x_{22} + 0.61x_{23} = 13.3\%$$
$$\varepsilon_3 = 0.79x_{31} + 0.57x_{32} + 0.70x_{33} = 10.7\%$$
$$\varepsilon_4 = 0.87x_{41} + 0.67x_{42} + 0.36x_{43} = 9.98\%$$
$$\varepsilon_5 = 0.69x_{51} + 0.75x_{52} = 9.44\%$$
$$\varepsilon_6 = 0.71x_{61} + 0.63x_{62} = 9.09\%$$

CONCLUSIONS AND RECOMMENDATIONS

The main objective of this study was to examine student attitudes towards sustainable agriculture. This section concludes the main findings and also discusses the implications and interconnection of results attained. Student responding rated themselves as having appropriated attitudes of sustainable agriculture. In this regard, the ratings of their beliefs about sustainable agriculture were especially high for environmental and social dimensions, but less so for food security and economic aspects. As students valued sustainable agriculture only if the practices were in harmony with nature and profitable and perceived that farmers would only use practices that were environmentally sound and economically viable Similar thoughts regarding sustainable agriculture were observed among Iowa farmers [14].

To compare attitude components with determined factors, the following conclusions were drawn:

Factors of environment, economic and likelihood have cognitive and believe essence, in this context, students believed sustainable agriculture is in harmony with nature and help to provide food security for society. While, factors of management and agriculture systems are related to component of effective of attitude. As it appraises that adoption of sustainable agriculture practices will be easier for farmers who have both cropped and livestock enterprises and sustainable agriculture practices would work well on any farm. Finally, factor of sustainable agriculture practices such as soil conservation, integrated pest management, decreased use of fertilizers and other chemicals have implement interstice and is in conformity with conative component of attitude, that focus on actions.

To summaries about the connections of components and factors of attitudes, reserved that cognitive basis of students attitude regarding to sustainable agriculture is stronger than affective and conative infrastructure factors. As a result, to enhance student's attitudes towards sustainable behavior of agriculture, it is important developing curriculum to familiar student with sustainable agriculture practices and concepts such as: integrated pest management, low-input agriculture, rotational grazing, ecological agriculture, waste management, organic farming and alternative agriculture through:

Develop Farm-to-school (college) (FTS) programs that have garnered the attentions and energies of students in a diverse array of social locations in the food and agricultural system and are serving as a sort of touchstone for many in the alternative agri-food [15].

Develop programs of community gardens that have the potential to positively influence dietary behaviors and enhance environmental awareness and appreciation [16].

It is worth mentioning that the guidelines results in meeting the needs of students for preparing to enter the work force of the 21st century food and fiber system [17].

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