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Strategies Affecting the Success of Extension Programs Regarding Sustainable Natural Resource Management

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Abstract: This study was intended to draw factors affecting the success of extension programs regarding sustainable natural resource management. This research was conducted in the province of Hamedan, Iran. A sample of 76 extension workers was selected through classified sampling technique. To identify the effective factors to success extension programs, a self-designed questionnaire was developed to gather data. For determining the validity of questionnaire, the face and content validity was used. Reliability for the instrument was estimated at 0.81. According to factor analysis, the effective strategies for the success of extension programs were categorized into four groups that those factors explained 73.805% of the total variance of the research variables. The results also indicated that situational conditions of extension programs had the most effects on the success of extension programs. Enter multiple regression using factor scores indicated that the first, second and third factors explained a statistically significant portion of variance(R square = 43.5) for "the extent in which extension programs could be of effect" regarding sustainable natural resource management. Regarding the standardized coefficients, "situational conditions of extension programs " was considered as the most effective factor in predicting variance of the dependent variable.

Key words: Extension programs · Strategies · Sustainable natural resource management

INTRUDUCTION

Despite the high value of natural resources in environmental and socio-economic development they are being gradually destroyed due to population growth, over exploitation, lack of people's knowledge, insufficient educational programs and low level of environmental conservation practices in developing countries and agricultural education and extension organizations are not always structured to deal with the complexity of this issue [1]. According to the published statistics, in Iran, in every year there is 1/5 million tons of soil erosion and 400 billion m3 (cubic meter) waste of water. moreover, 2 million hectares of rangelands are destroyed. Also, in Hamedan province in every year, there is 855 thousands tons of soil erosion (yearly 8000 to 10000 kg in each hectare) and 900 million m3 waste of water [2]. The increasing concern with environmental protection and the preservation of natural resources makes research and teaching on subjects such as crop protection and integrated pest management, rational use of fertilizers and soil and water conservation more pressing. In addition, farmers need to have the knowledge, skills and attitudes required for sustainable agricultural and rural development [3]. Natural resources are directly relevant to sustainable Agricultural development. Hence, environmental educations must be dominated in extension and education programs [4]. Moreover, importance and roles of natural resources should be educated to all people using various teaching methods [5]. Tennyson [6] reported that educations in terms of natural resource subjects are more considered in many of countries through out the world. On the other hand, a system for sustainable service delivering must be able to consider its effective external and internal factors and get flexible strategies towards goals. Conventional agriculture extension systems in developing countries have different obstacles that result in un-sustainability of these systems. For example, they don't use approaches and strategies which help them for internal developing and reducing dependency to the external sources. Thus, developing countries must improve and strengthen their own extension systems for more sustainability

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through participatory approaches and necessary strategies [7]. Garforth [8] believes that un-sustainability in conventional extension systems is obvious and if governmental and international supports (financial and etc) discontinue, they won't be able to continue for delivering service to target groups. Because of population growth, over exploitation, environmental pollution, lack of political stability and economic crises, ways and methods of service - delivering to farmers should be reviewed [9].

It results from the above, necessary and essential strategies that strengthen and improve foundations of extension and education programs should be applied. Therefore, the primary purpose of this study was to build a foundation for essential strategies needed for the success of natural resource (water and soil) extension programs in the province of Hamedan, Iran. The specific objectives of this study were to: (1) describe the demographic profile of Hamedan Province farmers and users, (2) investigate the relationships between the extent in which extension programs could be of effect in terms of sustainable natural resource management and twenty seven effective essential strategies (variables).

And (3) identify effective and essential factors for the extent in which extension programs could be of effect in relation to sustainable natural resource management.

MATERIALS AND METHODS

This study was conducted in the province of Hamedam, located in the west part of Iran. Statistical sample in this study was drown randomly from 122 extension workers working in Jihad-e-agriculture of Hamedan. A number of 76 extension workers were selected through classified sampling. Considering investigation on the relations between variables, this research is a descriptive-correlation research [10]. The research design for this study was a survey design. From a review of the literature, the researchers developed an instrument to collect data. The survey was divided into two sections. The first section was designed to gather data on personal characteristics of extension workers, included gender, age, years of work experience, level of education and post title. The second section was designed to gather data about extension workers perceptions with respect to the effective and essential strategies that would promote the extension programs in terms of natural resource management. Respondents were asked to rate their viewpoints concerning these strategies on a five point Likert-type scale:(5 = very much, 4 = much, 3 = moderate, 2 = low and 1 = very low). Face and content validity of the questionnaire were established using a panel of experts consisting of faculty members in the department of agricultural extension and education in Tehran science and research university and extension officers. Questionnaire reliability was estimated by calculating Cronbach's alpha coefficient. Reliability for the instrument was estimated at 0.81. The data were collected between October, 2006 and March, 2007. After gathering and encoding information from the questionnaires, data was obtained for analysis. Data collected were analyzed using the statistical package for the social sciences (SPSS, 14). Beside descriptive statistics, analytical statistics (factor analysis and regression) were employed for detailed analysis. Also, the dependent variable of the research is "the extent in which extension programs could be of effect associated with sustainable natural resource management "that was assessed through a five point Likert-type scale and independent variables are "the factors" obtained from factor analysis for twenty-seven effective strategies needed for promoting, strengthening and to success natural resource extension programs.

RESULTS AND DISCUSSION

Descriptive Statistics: The first objective was to describe the demographic profile of farmers and users of the Hamedan Province. Majority of respondents were men (88%). Average age of respondents was thirty-eight. Minimum age of respondents was 21 and maximum age was 53. Their average work experience was 14 years, 48% of respondents have less than 1 to 12 years of work experience and the rest were between 12-28. Regarding respondents' education levels, approximately two-thirds of them were BS (61.6 %), 11% were Ms and 27.6% were associate diploma. According to the post title 25.4% of respondents were extension agents, 42.3% had managerial tasks and 32.3% were as experts.

The second objective was to investigate the relationships between the extent in which extension programs could be of effect in relation to sustainable natural resource management and twenty-seven effective essential strategies (variables). The results obtained from calculating correlations between variables showed positive and statistically significant relations between "the extent in which extension programs could be of effect in relation to sustainable natural resource management" and the twenty-seven investigated variables (strategies). Results from correlation analysis are shown in Table 1.

Table 1: Results of correlation analysis for the extent in which extension programs could be of effect and effective variables (strategies)

Variables (Strategies)	Sig.	R(r)
Group learning methods and exchange of knowledge and skills	0.000	**0.471
Using modern information and communication technologies	0.028	*0.254
Integration of modern and indigenous knowledge	0.000	**0.490
Establishing and strengthening horizontal relations and networking to exchange Knowledge and information among agents	0.000	**0.443
Using team approaches and group working such as team work	0.000	**0.456
Developing and strengthening relationships between research and extension	0.000	**0.495
Using monitoring and evaluation processes regarding extension activities	0.000	**0.440
Adequate technical competencies and knowledge of extension agents	0.003	**0.344
Developing in-service education in terms of participatory methods and inter-personal skills	0.000	**0.448
Existing favorable political situation for agriculture	0.000	**0.406
Governmental legal support of extension programs	0.000	**0.527
Giving proper ownership rights to users	0.000	**0.460
Giving public subsidizes to users in return for utilizing conservational technologies	0.000	**0.513
Access to credits and loans to utilize conservational technologies by users	0.000	**0.611
Building sufficient infrastructures in watershed zones	0.000	**0.544
Governmental financial support of extension programs	0.000	**0.621
Delivering information to the farmers and the users in relation to the market	0.000	**0.560
Economic stability of the community	0.000	**0.615
Using educational aids (educational technologies)	0.000	**0.407
Down-top management and decentralization in terms of authority	0.000	**0.559
Strengthening establishment, organization and participation of local groups	0.000	**0.559
Change management and organizational development to keeping with participatory approaches	0.000	**0.517
Encouraging user's accountability and assigning responsibility to them	0.000	**0.422
Agent's ability to encourage participation of people in planning and implementing natural resource projects	0.000	**0.334
Agent's ability in facilitation skills and participatory methods	0.000	**0.342
Networking to exchange information and educational experiences at national and international level	0.000	**0.530
Encouraging client's financial participation in extension and conservational programs	0.000	**0.524

(r) =Spearman's correlation coefficient source: results of research **0.01> P * 0.05> P

* The extent of the importance and the effect of each variable (strategy) regarding the success of extension programs was quantified through a five point Likert-type scale: (5 = very much, 4 = much, 3 = moderate, 2 = low and 1 = very low)

Table 2: Results of factor analysis for effective factors to success extension programs in relation to sustainable natural resource management and the variables of each factor

Effective factors to promote extension programs in relation to sustainable natural resource management	Mean± SD	Factor Loading	Eigenvalues	Variance (%)
Situational conditions of extension programs			16.218	60.068
Networking to exchange information and educational experiences at national and international level	3.03±1.29	0.614		
Existing favorable political situation for agriculture	3.34±1.12	0.602		
Giving proper ownership rights to users	3.41±1.17	0.707		
Governmental legal support of extension programs	3.49±1.23	0.700		
Giving public subsidizes to users in return for utilizing conservational technologies	3.11±1.18	0.712		
Encouraging client's financial participation in extension and conservational programs	3.17±1.15	0.606		
Access to credits and loans to utilize conservational technologies by users	3.50±1.07	0.583		
Building sufficient infrastructures in watershed zones	3.41±1.20	0.724		
Governmental financial support of extension programs	3.49±1.26	0.742		
Economic stability of the community	3.78±0.98	0.785		
Delivering information to the farmers and the users in relation to the market	3.54±1.02	0.777		
Management and organization of extension programs			1.475	5.465
Establishing and strengthening horizontal linkages and networking to exchange knowledge and Information among agents	3.26±0.96	0.638		
Down-top management and decentralization in terms of authority	3.18±1.19	0.668		
Developing and strengthening relationships between research and extension	3.25±1.30	0.715		
Change management and organizational development to keeping with participatory approaches	3.29±0.99	0.562		
Strengthening establishment, organization and participation of local groups	3.29±1.12	0.783		
Using team approaches and group working such as team work	3.29±1.12	0.737		
Using monitoring and evaluation processes regarding extension activities	3.66±0.97	0.615		
Developing in-service education in terms of participatory methods and inter-personal skills	3.5±1.030	0.707		
Encouraging user's accountability and assigning responsibility to them	3.65±1.01	0.654		

Table 2: Continued

Extension approaches and methods			1.184	4.387
Group learning methods and exchange of knowledge and skills	3.45±0.98	0.514		
Using modern information and communication technologies	3.34±0.99	0.809		
Integration of modern and indigenous knowledge	3.63±1.00	0.676		
Using educational aids (educational technologies)	3.5±1.030	0.547		
Extension worker's competencies			1.049	3.885
Agent's ability to encourage participation of people in planning and implementing natural resource projects	3.61±1.07	0.743		
Adequate technical competencies and knowledge of extension agents	3.71±1.09	0.832		
Agent's ability in facilitation skills and participatory methods	3.67±1.10	0.747		

Source: results of research

Table 3: Results of multiple regression analysis for the extent in which extension programs could be of effect in relation to sustainable natural resource management using factor scores

Factor	B	Std. Error	p. r.	t	Sig.
Constant	20.955	0.556		37.691	0.000
Situational conditions of extension programs	3.332	0.556	0.550	5.994	0.000
Management and organization of extension programs	1.874	0.559	0.308	3.352	0.001
Extension approaches and methods	1.157	0.560	0.19	2.066	0.043

$R^2AD = 0.41$ $R^2 = 0.435$ $R = 0.66$

$F = 17.199$ $Sig = 0.000$

Source: results of research

Analytical Statistics: The third objective was to identify effective and essential factors needed for the extent in which extension programs could be of effect in relation to sustainable natural resource management. To summarize the variables of the research to a smaller quantity and to build a foundation for twenty-seven effective strategies needed for promoting and strengthening natural resource extension programs exploratory principal component analysis (PCA) was conducted and the obtained factors were subjected to VARIMAX rotation. The value of the Kaiser – Meyer – Olkin measure of sampling adequacy (KMO) was 0.92. Nelson and Thompson [11] reported that KMO values of 0.6 and above are required for good factor analysis. Using the eigenvalue greater than one rule the PCA suggested the presence of 4 factors, which accounted for 73.805% variance in scores. The factors were named as follows: (1) situational conditions of extension Programs, (2 management and organization of extension programs, (3) extension approaches and methods and (4) extension worker's competencies. The first factor explained the most variance of the total variances of the variables (60.068%). The second factors explained 5.465% of variance. The third factor explained 4.387% of variance and the fourth factor explained 3.885% of variance. The findings of factor analysis have been shown in Table 2.

This table indicates that in the first factor " economic stability of the community" and "delivering information to the farmers and the users in relation to the market" had the most factor loadings respectively (Loadings = 0.785 and 0.777), in the second factor " strengthening establishment, organization and participation of local groups", in the third factor " using modern information and communication technologies" and in the forth factor "adequate technical competencies and knowledge of extension agents" had the most factor loadings.

In addition, enter multiple regression using factor scores implemented. Results indicated that first, second and third factors explained a statistically significant portion of variance (R square = 43.5) for "the extent in which extension programs could be of effect associated with sustainable natural resource management ". Considering to the standardized coefficients, "situational conditions of extension programs "was considered as the most effective factor in predicting variance of the dependent variable (p. r. = 0.55). Therefore, in comparison with the other factors, this factor is considered as the most effective factor to success of extension programs regarding sustainable natural resource management.
Results have been indicated in Table 3.

According to the Findings of Table 3 Regression Equation Is as Follows:

$$Y = 20.955+3.332(F_1)+1.874(F_2)+1.157\ (F_3) \qquad (1)$$

CONCLUSION

Based on the findings of the present study, it is recommended that the government in Iran should determine and establish stable and definite economic policies for agriculture, for example about exports,

imports, subsidizes, credits, loans, insurance and so on. They should forecast and estimate prices of agricultural products based on these policies and publish enough information about prices and markets to the farmers and the users, so they can plan for their agricultural activities and get more outcomes. Also, they should provide and give enough credits and loans to encourage them to participate in extension programs and utilize conservational technologies, in order to promote extension programs associated with natural resource management process.

Also, using farmers group approach such as formal cooperatives, informal forums of farmers and farmers' national organizations in extension services could be of effect for strengthening organization and participation of local groups. These groups could facilitate farmer-to-farmer extension process and reduce personal costs through sharing the costs among members of the groups.

It is recommended that managers, extension specialists and agents use and apply participatory methods and approaches such as participatory rural assessment for planning and delivering natural resource extension programs. Application of such approaches are useful to enhance group working in extension services.

With few exceptions, relationships between agricultural education and extension systems and agricultural research services were inadequate. In many countries, this is the result of the deliberate separation of research and education. Agricultural research is generally conducted in research stations and laboratories, the majority of which are not linked with extension, although cases of collaboration between staff exist. Therefore, through using participatory approaches such as participatory technology research and development, farming systems research and extension, professional linkages between extension workers and researchers should be encouraged and strengthened.

In comparison with, the importance and the effect of favorable situational conditions for agricultural development and extension services and the importance of management to success of organizations, extension methods perceived by extension workers less important and therefore obtained less effect upon success of extension programs in factor and regression analysis.

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