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THE IMPACT OF INDEPENDENT VARIABLES ON PERFORMANCE OF AGRICULTURAL EXTENSION MANAGEMENT IN EASTERN LIBYA: TOWARD REORGANIZATION FOR SUSTAINABLE AGRICULTURAL DEVELOPMENT

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ABSTRACT

The specific objectives of Sustainable agricultural development are to enhance food security; to increase productivity and competitiveness of the sector; to deepen linkages with other sectors; to create new sources of growth for the sector; and to conserve and utilize natural resources in a sustainable basis. To achieve this participation, extension organizations would need to formally of decentralization and Pluralism or transfer the control of specific program planning and management functions to the system levels of local Agricultural extension, Private sector organizations, Farmers organizations and Education organizations where extension programs are actually implemented. A survey study was applied as a methodology of research .A questionnaire was used to collect the data and Analysis of descriptive statistics. Results: According to factor analysis, the implications for sustainable agricultural development were categorized into two groups consisting: (a) The Decentralization (b) The Pluralism. The results of the multiple correlation coefficient measure (R=0.584) indicate that the relationship between decentralization and continuous independent variables is moderate and positive. The value of coefficient of determination (R^2) implies that about 34.1% of the variation in decentralization is explained by the independent variables in the model. Also, the ANOVA results show significant differences with pluralism (F=3.386, p=0.005).

KEYWORDS: Independent Variables, Agricultural Extension, Decentralization, Pluralism, Eastern Libya. Sustainable Agricultural Development.

INTRODUCTION

Sustainable agriculture, although a difficult term to define operationally, includes the practice of low input agricultural production technologies, which attempts to ensure the profitability of farms while preserving the environment. And from the market point of view, these products obtained are sold at profitable prices which would provide incentives for farmers to adopt the necessary methods (Dennehy *et al*., 2000). Agricultural development plans (1972–1986). During the last thirty years water and land resources have been excessively used beyond sustainable levels (Jamahiriya, 2006b).Therefore the proposed plan recognizes the importance of improving the role of extension in sustainable agricultural development to meet higher production targets and achieve higher farmer incomes (Jamahiriya, 2006a). In 1974 Libya hosted the meeting of the Arab Deans of Agricultural Colleges, in which they discussed the extreme importance of extension services to the agricultural development efforts of all Arab states. Since then, concerted efforts have been made to improve extension services (Jamahiriya, 2006b). The Rehabilitation of the agricultural sector, which requires major investments in infrastructure, capacity building (education, training, extension and research) and therefore the following is suggested: (1) Evaluation of implemented settlement schemes to assess necessary adjustments; (2) Provision of services and agricultural inputs to farmers to overcome natural resources constraints and (3) Plan also calls for linking agricultural extension offices with experimental stations of the Agricultural research center (Jamahiriya, 2006a). Libya's most important natural resources are its oil and natural gas reserves, which dominate its economy, Its other significant resources are, gypsum, limestone, marine salt, potash, and sodium carbonate (Jamahiriya, 2006a). Agriculture is the second-largest sector in the Libyan economy and the country depends on imports in most foods. Climatic conditions such as low annual rainfall and poor soils limit farm output, and domestic food production meets about 25% of demand. Domestic conditions limit output, while income and population growth have increased food consumption. Total arable land in Libya is estimated at 3.6 million hectares, representing only 2 percent of total land area and located mostly along the coast, of which rain fed agriculture in regions receiving more than 300 mm annually is estimated at only 220,000 hectares, devoted mainly to cereals, forages and some fruit trees. Areas receiving 200–250 mm of rain annually are estimated at 3.2 million hectares dedicated to irrigated agriculture in addition to 14 million hectares of forest and range lands considered by many to be the most limiting factor to agricultural development (Jamahiriya, 2006a). The country's water resources include: (i) aquifers, which constitute about 90 percent of

water resources and are mostly (about 80 percent) used for agriculture; (ii) surface water from rain, some of which is harvested, with the total capacity of all dams estimated to be 120 million cubic meters (Mm^3) annually. (iii) Desalinated water, estimated at 100 Mm^3/year; and (iv) recycled water, estimated at 110 Mm^3/year. Yearly demand for water on the other hand, in 2000 was estimated at 2,164 Mm^3 (81 percent) for agricultural use, 435 Mm^3 (16 percent) for municipal use and 60 Mm^3 (3 percent) for use by industry (Jamahiriya, 2006a). The study focused on the eastern part of Libya that relies on rain-fed and irrigated crops, and livestock; there were all together 1350 farms which are grouped into six major agricultural regions: Tubruq, Derna, Al Bayda, Al Marj, Benghazi and Ajdabiya. Most of the arable land and pastureland of Libya is in the eastern parts of the coastal belt. Grains are grown and some livestock is grazed to a lesser extent in the southeast area. Cultivation is sporadic and dependent on rainfall (Laytimi., 2002). Several stone fruit tree plantations of small and medium size are present; and Principal crops produced include vegetables, fruits, wheat, barley and dates while principal livestock include Sheep and goat flocks which are relatively large .Many camels, cows and poultry farms are also observed. Agriculture infrastructure, machinery and agricultural extension service centers are present across the eastern area (FAO. 2011).

METHODOLOGY

The quantitative method was used. The survey divided into six areas namely of Tubruq, Derna, Al Bayda, Al Marj, Benghazi and Ajdabiya in Eastern Libya. Data collected through the use of questionnaires on a sample of managers and deputy directors involved in Agricultural extension services in the study area. while 50 did not respond. Fifty questionnaires were distributed in the eastern region of Libya, but only 25 managers and 21 deputy directors responded (response rate=92%), with four questionnaires not returned. Based on the objectives of the

study and nature of the data available, different analytical techniques have been the appropriate descriptive statistics were performed using the statistical package for social sciences SPSS® for Windows, version 16. Multiple regression analysis was used to test the significance of the association between independent variables and the dependent variables. Statistical significance was accepted at a P value of < 0.05.

RESULTS
The impact of independent variables on decentralization

The research determined that some of the organizational characteristics are correlated with the five factors (policies, financial resources, communication mechanism, training programmes and reward system) in addition to some support mechanisms (educational organizations, farmers' organizations and agricultural credit organizations) with decentralization (Figure1). Policies are intended to promote cooperation and coordination among agricultural development organizations through decentralization. The necessary reforms include decentralization of responsibility, delegation of authority to district managers and teams, autonomy in routine decision making and a separate budget for operational expenditure to achieve Deconcentration. So, under this arrangement, programme planning, management and co-financing responsibilities are transferred to agriculture sector management in the region to achieve devolution. In addition to providing feedback, fee-for-service can also provide additional sources of revenue for agricultural extension, and agricultural extension services may benefit from the revenues (cost recovery). Also, the participation of local committees (local leaders, farmers' organizations and agricultural credit organizations) in the dissemination of sustainable agricultural development programmes and in the collection of taxes and financial charges from the farmers due to the extension services and loans to achieve delegation.
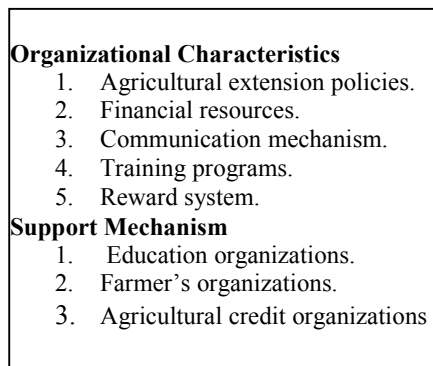
INDEPENDENT VARIABLES   **DEPENDENT VARIABLES**

Figure 1: The framework of independent variables and decentralization

The result of multiple linear regression analysis on the quantitative relation between organizational characteristics and support mechanisms and decentralization is presented. The results (see Table 1) of the multiple correlation coefficient measure (R=0.584) indicate that the

relationship between decentralization and continuous independent variables is moderate and positive. The value of the coefficient of determination (R^2) implies that about 34.1% of the variation in decentralization is explained by the independent variables in the model.

Table 1: Model summary of regression variables

Model Summary			
Model	R	R Square	Adjusted R Square	Std. Error of The Estimate
1	0.584	0.341	0.198	0.49855

The ANOVA results in Table 2 show significant differences with decentralization (F=2.391, p=0.035). The values were found to be of statistical significance (p>0.05).

Table 2: ANOVA of regression

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	4.755	8	0.594	2.391	0.035
Residual	9.196	37	0.249		
Total	13.951	45			

Significant at 0.05 level

Table 3 shows that out of the eight factors considered in the model, only three variables were found to influence decentralization significantly at the 0.05 level of significance. These variables include agricultural extension policies, financial resources and communication mechanism. Five of the variables were found to have no significant influence on decentralization in the study area.
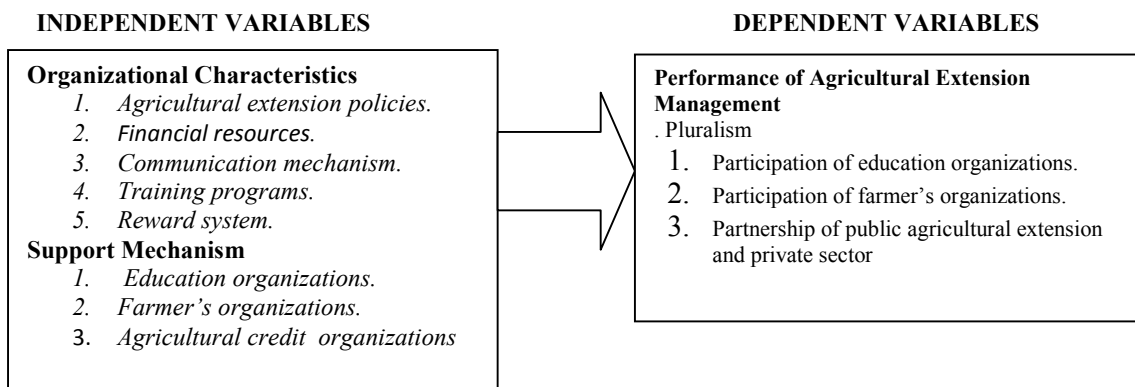
Table 3: Coefficients of regression

variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-0.120	1.344		-0.090	0.929
Agricultural extension policies	0.504**	0.235	0.309	2.144	0.039
Financial resources	1.190**	0.418	0.778	2.847	0.007
Communication mechanism	1.120**	0.452	0.639	2.478	0.018
Training programs	0.300	0.256	0.256	1.170	0.250
Reward system	-0.106	0.213	-0.088	-0.500	0.620
Educational organisations	-0.130	0.299	-0.079	-0.436	0.665
Farmers organisations	0.224	0.237	0.143	0.942	0.352
Agricultural credit organisations	0.111	0.418	0.054	0.266	0.792

** Significant at 0.05 level

The impact of independent variables on pluralism
The main challenge in installing a proper pluralistic agricultural extension mechanism is the effective coordination among various organizations (Figure 2).Thus, policy makers should entrench linkage mandates into policies establishing extension systems and strategies for enhancing private sector participation in knowledge transfer to achieve partnership in public agricultural extension and the private sector. This is because the advisory planning committees should include representatives from the Ministry of Agriculture, colleges of agriculture, agricultural training centres and the private sector. In addition, agricultural research institutes and agricultural universities participate in the delivery of extension services. This proximity to major research institutions provides an advantage in relation to accessing expertise for trainingto achieve the participation of educational organizations. Institutional reorientation can be achieved by strengthening farmers' organizations to take a decisive role in determining extension agendas, programmes and services through contracting with the private sector and providing support for local innovationto achieve the participation of farmers' organizations.

INDEPENDENT VARIABLES   DEPENDENT VARIABLES

Organizational Characteristics
1. *Agricultural extension policies.*
2. *Financial resources.*
3. *Communication mechanism.*
4. *Training programs.*
5. *Reward system.*
Support Mechanism
1. *Education organizations.*
2. *Farmer's organizations.*
3. *Agricultural credit organizations*

Performance of Agricultural Extension Management
. Pluralism
1. Participation of education organizations.
2. Participation of farmer's organizations.
3. Partnership of public agricultural extension and private sector

Figure 2: The framework of independent variables and pluralism

The result of multiple linear regression analysis of the quantitative relation between organizational characteristics and support mechanisms and pluralism is presented. The results of the multiple correlation coefficient measure (R=0.650) indicate that the relationship between pluralism and the continuous independent variables is moderate and positive. The value of the coefficient of determination (R^2) implies that about 42.3% of the variation in pluralism is explained by the independent variables in the model (Table 4).

Table 4: Model summary of regression variables

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of The Estimate
1	0.650	0.423	0.298	0.60771

In addition, the ANOVA results in Table 5 show significant differences with pluralism (F=3.386, p=0.005). The values were found to be of statistical significance ($p>0.05$).

Table 5: ANOVA of regression

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	10.004	8	1.250	3.386	0.005
Residual	13.664	37	0.369		
Total	23.668	45			

Table 6 shows that out of the eight factors considered in the model, only three variables were found to have a significant influence on pluralism at the 0.05 level of significance. These variables include agricultural extension policies, educational organizations and farmers' organizations. Five of the variables were found to have no significant influence on pluralism in the study area.

Table 6: Coefficients of regression

variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-2.734	1.639		-1.668	0.104
Agricultural extension policies	1.346**	0. 510	0.676	2.642	0.012
Financial resources	0.037	0.259	0.023	0.142	0.887
Communication mechanism	-0.144	0.364	-0.067	-0.394	0.696
Training programs	0.290	0.312	0.190	0.928	0.359
Reward system	0.076	0.286	0.036	0.266	0.792
Education organizations	1.275**	0. 551	0. 559	2.314	0.026
Farmer's organizations	1.065**	0.510	0. 397	2.088	0.044
Agricultural credit organisations	0.277	0.289	0.137	0.958	0.344

** Significant at 0.05 level

DISCUSSION

The study also found that all the organizational characteristics and support mechanisms are correlated with decentralization. Policies are intended to promote cooperation and coordination among agricultural development organizations through decentralization and therefore more policies for agricultural extension and a permanent basis for interaction between the organizations involved should be implemented, in accordance with a previous study by Okorley et al. (2009a). Also, fiscal sustainability is a generic problem that affects many large-scale public agricultural extension systems, and Deconcentration is nearly always a first and necessary step in any process of decentralization and should be achieved through delegating a separate budget for operational expenditure to district managers and teams (director, director's assistant and supervisors). This finding is consistent with that of Sulaiman et al. (2003). In addition, devolution can take place by transferring the responsibilities of co-financing to agricultural sector managements in the region. This result is consistent with the study of Okorley et al. (2009a). Also, the collection of taxes and financial charges from the farmers due to the extension services and loans can be delegated to local committees (local leaders, farmers' organizations and agricultural credit organizations). This is consistent with the study of Ozor et al. (2009). The private sector can be contracted to provide agricultural equipment in the provision of extension services, as well as in the re-employment of retrenched field staff and deployment of more well-trained and adequately remunerated staff. This result is consistent with the study of Bardon et al. (2009). Adding to sustainable agricultural development is a communication process, because communication media play an important role in sustainable agricultural programmes. The dissemination of sustainable agricultural development programmes can be delegated to the local committees (local leaders, farmers' organizations and

agricultural credit organizations). This supports the views of Rivera et al. (2004).adding to Policies that are intended to increase the involvement of the private sector lead to an effective agricultural extension system that delivers appropriate agricultural information and the formation of groups to pool resources to improve farming collectively. This finding is consistent with the work of Bardon et al. (2009). Also, agricultural universities and research institutes also have an active role to play in development activities by providing training courses for employees and farmers focusing on sustainable agricultural development through field schools (classroom training and on-farm and field visits). This particular finding is consistent with the results of research undertaken by Davis et al. (2010). In addition, participation by farmers' organizations allows the provision of training for their staff on sustainable agricultural development programmes, in accordance with the previous study by Okorley et al. (2009b). Also, training courses for farmers focusing on sustainable agricultural development can be provided through field schools by coordination with educational organizations. This supports the views of Barrick et al. (2009).

CONCLUSION

Agricultural extension systems in world are struggling to prove their importance and relevance to sustainable agricultural development. In order to solve of Problems of rural development, Agricultural extension systems need to encourage the active participation of Farmers in planning, implementing, and monitoring Agricultural extension programs. To achieve this participation, extension organizations would need to formally of decentralization and Pluralism or transfer the control of specific program planning and management functions to the system levels of local Agricultural extension, Private sector organizations, Farmers organizations and Education organizations where extension programs are actually implemented. This paper are be reviewed the recently studies of Decentralization of agricultural Extension and Pluralism of agricultural Extension.

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