International Journal of Agricultural Management and Development (IJAMAD)
Available online on: www.ijamad.com
ISSN: 2159-5852 (Print)
ISSN:2159-5860 (Online)
DOI: 10.5455/ijamd.173812

Factor Analysis of Agricultural Development Indicators from Iranian Agriculture Experts' Viewpoints

Mohammad Sadegh Sabouri [1] and Meysam Solouki [2]

Received: 27 November 2014,
Accepted: 13 February 2015

Abstract

Agriculture and its development is the foundation of development in Iran as a developing country. So, it can be regarded as the foundation for economical and social development. The capabilities of agriculture sector are limited and its efficiency is trivial because of neglecting agricultural development and keeping its support just as a slogan. The transformation of agriculture to a developed, dynamic, efficient environment depends not only on appropriate climate and natural resources but also on human resource development in the relevant sector. The main purpose of the present research was to study and recognize agricultural development indicators from agriculture experts' viewpoints (including researchers, trainers and extension experts) in six provinces in Iran on the basis of Adjacent Provinces Plan. The study was designed with three phases of theoretical foundations, field operations and data analysis. The statistical population was 863 experts, out of which 198 experts were selected by stratified sampling. The validity and reliability of measurement tool (questionnaire) was analyzed by SPSS software package. The study was a correlation-descriptive study in which factor analysis statistics was used in addition to descriptive statistics. Experts grouped indicators of future agricultural development in nine groups (access to inputs, application of technologies for the development of human resource and sustainability; reduction of losses; economical development; improvement of infrastructures; agricultural mechanization; social status; improvement of marketing; land reform; yield increase). Results about the difference in respondents' viewpoints revealed significant differences in experts' viewpoints in six studied province about relevant variables and in their viewpoints about the components of agricultural development (infrastructure improvement, marketing, optimum management and sustainability, human resource development and economical development).

Keywords:
Agricultural Development, Agricultural development indicators, Researchers, Extension experts, Technical agricultural trainers, Iran

[1] *Young Researchers and Elit Club, Garmsar Branch, Islamic Azad University, Garmsar, Iran.*
[2] *Young Researchers and Elit Club, Islamshahr Branch, Islamic Azad University, Islamshahr, Iran.*
* *Corresponding author's email: Sabouri5413@yahoo.com*

INTRODUCTION

As one of the sub-sectors of economical development, agricultural development has been affected by the pattern of changes during development. Zamanipour (2001) defines agricultural development as a transition from traditional farming and a process during which most farmers' socio-economical condition is improved. Agricultural development is a set of quantitative and qualitative objectives of development which are determined by state policymakers to ensure food security and increase the production for stimulating economical growth or to specify how training and healthcares are supplied to ensure village production (Swanson *et al.,* 2002). Berdegué and Escobar (2001) define agricultural development as a set of processes for improving farming conditions by the aid of developing cooperative technology, field research and farmers' involvement in relevant activity through local communities. The Consultative Group for International Agricultural Research (CGIAR, 2002) defines agricultural development as the improvement of efficiency and stability of farming, mitigation of soil erosion, restoration and resurrection of forests and accomplishment to food security for the public through developing the human resource of this sector.

Some factors and concepts of agricultural development which have been already studied included production increase (Johl, 2001; North, 2001 Swanson *et al.*, 2002; Zamanipour, 2001), yield increase (Navarro, 2006; Perti, 2002; Shahbazi, 2003), human development in agriculture sector such as improving capacities, yields and people's skills in coping with challenges (Berdegué and Escobar, 2001; Zamanipour, 2001; van den Bon and Hawkyns, 2007; Suleiman and van den Ban, 2000; Verschoor *et al.,* 2005; Tripathi, 2003), reduction of wastes and losses (Miller, 2004; North, 2001; Planning Research Institute of Agriculture and FAO Economics, 2006), marking improvement (Suleiman and van den Ban, 2000; Navarro, 2006; Johl, 2001), access to modern production inputs (Shahbazi, 2003; Johl, 2001; Dubois, 2002; Planning Research Institute of Agriculture and FAO Economics, 2006), technological changes including production, supply and access to appropriate production technologies (Shahbazi, 2003; Navarro, 2006; Zamanipour, 2001; Suleiman and van den Ban, 2000; Berdegué and Escobar, 2001), optimum and sustainable management such as optimum use of resources and production inputs like water, soil, fertilizers, pesticides, reducing deforestation and the deterioration of natural resources (CGIAR, 2002; Navarro, 2006; Perti, 2002; Johl, 2001), improvement of economical opportunities like higher export, diversified production, lower production costs and higher purchase power (World Bank, 2007; Navarro, 2006; North, 2001; Miller, 2004), improvement of infrastructures like mechanization, construction of irrigation channels, silos and cold storage (Navarro, 2006; Shakoori, 2006; Planning Research Institute of Agriculture and FAO Economics, 2006; World Bank, 2007), and establishment of farmers' production communities (Zamanipour, 2001; Verschoor *et al.,* 2005).

Modern measures of agricultural development consider indicators of the use of public cooperation in design and implementation, development of human capacities, economical diversity and integrated social provision (adapting agricultural technologies with social realities, managerial and skill levels) in the form of social institutions (Verschoor *et al.*, 2005).

As can see in the literature on agricultural development, most agricultural development concepts are, in most countries, based on the transfer of technology and green evolution which started in Mexico in the 1940s and reached other countries in the 1960s, though initiated at first to increase the production and cultivation area, to optimally use production resources, to reduce losses and to increase crop quality.

In total, Johl (2001) divides agricultural development into four stages: (i) pre-green evolution stage aimed at the use of traditional species, the increase in cultivation area, investment on irrigation infrastructure and soil fertilization; (ii) green evolution aimed at the use of modern species; (iii) post-evolution stage during which chemical fertilizers and modern inputs were come into use, and (iv) post-evolution last stage in which agriculture was developed to use better information and management skills for better

application of inputs. Criteria like sustainability were added in recent decades, too.

MATERIALS AND METHODS

The present study was carried out to determine agricultural development indicators from the experts' viewpoints. The experts included three groups: researchers, extension experts and technical trainers in agriculture sector. At sample selection stage, all provinces were divided into six groups in accordance with adjacent provinces plant of Ministry of Agriculture (2008). Then, samples were randomly taken from one province per each region as summarized in Table 1.

To estimate sample size for the selection from total number of target experts in Robat Karim Township, 30 experts were selected and asked to fill out the questionnaire. Then, standard deviation was calculated to be 0.394. The probable optimum accuracy was considered as 0.05 after consulting with supervisor in order to improve the accuracy. So, the sample size was determined as 187 experts out of 863 experts. It was, then, increased to 215 in order to improve the accuracy. Therefore, 57 researchers, 70 extension experts and 88 technical trainers were selected from the sample provinces.

The present study is a practical research because its findings can be practically used in agricultural development planning in Iran. In addition, it is a field study in terms of methodology and data collection methods. As the statistical test used for the grouping of agricultural development indicators dictates, it is a descriptive-correlation study in terms of research methodology.

RESULTS AND DISCUSSION

As is evident in table 2, the highest distribution of the frequency of experts' ages was devoted to age range of 36-40 years composing 30.3% of total respondents. Qom Province has the youngest experts in agriculture sector. Experts' mean age was 39.4 years old with the oldest being 58 and the youngest being 23.

As shown in table 3, over 86% of respondents were male and 12.6% were female. The highest frequency of female experts with respect to all respondents was found to be in Khuzestan Province. The highest frequency was devoted to males.

As table 4 presents, the highest official working experience was at two classes 11-20 years with 22.4% of respondents. The lowest working experience was one year and the highest one was 32 years.

17.7% of respondents had no working experience in agricultural activities and over 82% had experience in agricultural activities. As can be seen in Table 5, over 76% of respondents had appropriate experience in agricultural activities.

According to table 6, almost all sub-disciplines of agriculture could be found among respondents. Agronomy and Plant Breeding had the highest frequency (N = 40) followed by Agriculture Extension (N = 25). Horticulture was the third most frequent sub-discipline. Noteworthy, 9 respondents were graduates of disciplines other than agriculture.

Experts believe that future priorities of agricultural development include respecting farmers' self-esteem, reducing the losses of pests and improving farmers' management skills. These priorities included elimination of mediators and brokers, construction of irrigation channels and access to bred seedlings in West Azerbaijan Province. They included the reduction or stoppage of the destruction of natural resources (soil, environment, etc.) by farmers, fostering farmers' innovation and creativity in crop production and respecting farmers' self-esteem by public people in Ilam Province.

In Semnan Province, the first priority was the

Table 1: Statistical population of experts in agriculture sector

	Semnan	Mazandaran	Ilam	Qom	West Azeirbaijan	Khuzestan	Total
Researchers in agriculture sector	27	53	23	15	76	43	237
Extension experts	37	63	35	21	75	52	283
Technical agriculture trainers	49	69	43	34	87	61	343

Table 2: The distribution of the frequency of the ages of agriculture experts in terms of province

Age groups (yrs)	West Azeribaijan		Ilam		Semnan		Qom		Khuzestan		Mazandaran		Total		
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Total %
<25	-	-	-	-	1	3.8	3	17.6	-	-	1	2.1	5	2.5	2.5
26-30	7	12.7	3	12.5	4	15.4	3	17.6	-	-	2	4.2	19	9.6	12.1
31-35	9	16.4	5	20.8	5	19.2	5	29.4	1	3.4	4	8.5	29	14.6	26.7
36-40	17	30.9	8	33.3	7	26.9	4	23.5	6	6.8	18	38.3	60	30.3	57
41-45	11	20	2	8.3	6	23.1	1	5.9	5	17.2	12	25.3	37	18.7	87.7
46-50	7	12.7	4	16.7	3	7.7	1	5.9	13	44.8	7	6.4	34	17.2	92.9
51-55	2	3.6	1	4.2	1	3.8	-	-	2	6.9	3	14.9	9	4.5	97.4
56-60	1	1.8	-	-	-	-	-	-	-	-	-	-	1	0.6	98
No response	1	1.8	1	4.2	-	-	-	-	2	6.9	-	-	4	2	100
Total	55	100	24	100	26	100	17	100	29	100	47	100	198	100	-
Mean	38.42		37.04		37.04		33.65		41.5		40.74			39.46	
Variance	83.9		114.49		47.6		51.3		155		40.96			53.4	
SD	9.16		10.7		6.9		7.16		12.45		6.4			7.31	
Max.	26		26		24		23		35		23			23	
Min.	58		53		51		49		52		54			58	

Table 3: The distribution of the frequency of the gender of the agriculture experts

	West Azeribaijan		Ilam		Semnan		Qom		Khuzestan		Mazandaran		Total		
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Total %
Male	46	83.6	20	83.3	22	84.6	15	88.2	24	82.8	44	9.36	171	86.4	86.4
Female	8	14.5	3	12.5	4	15.4	2	11.8	5	17.2	3	6.4	25	12.6	99
No response	1	1.8	1	4.2	-	-	-	-	-	-	-	-	2	1	100
Total	55	100	24	100	26	100	17	100	29	100	47	100	198	100	-

insurance of produced crops, the second priority was the elimination of mediators and brokers and the third priority was access to bred seedlings. In Khuzestan Province, the first three priorities were found to be access to extension and agriculture experts, the reduction of crop loss at harvest time by making use of harvest machinery, and respecting farmers' self-esteem in public by institutions and agencies. These priorities were diversified crop production by

Table 4: The distribution of the frequency of office working experience (years) of agriculture experts.

Experience (yrs)	West Azeribaijan		Ilam		Semnan		Qom		Khuzestan		Mazandaran		Total		
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Total %
1-5	12	21.8	6	8.7	6	23.1	7	41.2	-	-	4	8.5	35	17.7	17.7
6-10	9	16.4	3	12.5	4	15.4	5	29.4	-	-	6	12.8	27	13.6	31.3
11-15	9	16.4	3	12.5	5	19.2	3	17.6	10	34.5	12	25.5	42	21.2	52.5
16-20	12	21.8	5	20.8	7	26.9	1	5.9	5	17.2	12	25.5	42	21.2	73.7
21-25	5	9.1	3	12.5	3	11.5	-	-	7	24.15	5	10.6	23	11.6	85.3
26-30	4	7.3	3	12.5	1	3.8	1	5.9	7	24.15	8	17	24	12.2	97.5
31-35	3	5.4	-	-	-	-	-	-	-	-	-	-	3	1.5	99
No response	1	1.8	1	4.2	-	-	-	-	-	-	-	-	2	1	100
Total	55	100	24	100	26	100	17	100	29	100	27	100	198	100	-
Mean	14.5		14.2		13.2		8.8		19.9		16.83		15.14		
Variance	59.4		76.7		57.2		54.8		27.66		55.5		67.4		
Min.	1		1		11		1		11		2		1		
Max.	32		29		.26		28		28		30		32		

Table 5: The distribution of the frequency of the experience of experts in farming activities.

Experience (yrs)	West Azeribaijan		Ilam		Semnan		Qom		Khuzestan		Mazandaran		Total		
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Total %
0	9	16.4	8	33.3	4	15.4	3	17.6	4	13.8	7	14.9	35	17.7	17.7
1-5	9	16.4	3	12.5	3	11.5	3	17.6	-	-	3	6.4	21	10.5	28.2
6-10	4	7.3	4	16.7	3	11.5	5	29.4	-	-	9	19.1	25	12.6	40.8
11-15	6	10.9	1	4.2	2	7.7	2	11.8	6	20.7	5	10.6	22	11.1	51.9
16-20	6	10.9	1	4.2	6	23.1	2	11.8	3	10.3	7	14.9	25	12.6	64.5
21-25	8	14.5	2	8.3	4	15.4	1	5.9	10	34.5	7	14.9	32	16.2	80.7
26-30	4	7.3	2	8.3	1	3.8	-	-	3	10.3	2	4.3	12	6.1	86.8
31-35	-	-	-	-	-	-	1	5.9	-	-	4	8.5	5	2.5	89.3
36-40	7	12.7	2	8.3	-	-	-	-	3	10.3	2	4.2	14	7.1	96.5
41-45	-	-	-	-	-	-	-	-	-	-	1	2.1	1	0.5	97
No response	2	3.6	1	4.2	3	11.5	-	-	-	-	-	-	6	3	100
Total	55	100	24	100	26	100	17	100	29	100	47	100	198	100	-
Mean	18.72		11.74		13.3		12.6		23.8		19.67		15.6		
Variance	153.01		182.25		90.25		90.82		67.24		125.44		151.78		
SD	12.37		13.5		9.5		9.53		8.2		11.2		12.32		
Max.	40		40		26		35		40		45		45		

farmers, exportation of agricultural productions and insurance of produced crops (agronomic, garden and livestock) in Qom Province. In Mazandaran Province, the priorities included respecting farmers' self-esteem, reducing losses caused by pests, and reducing the infection to diseases.

Factor analysis of future variables of agricultural development from experts' viewpoints

In this section, the data were analyzed by

Table 6: The distribution of the frequency of experts' academic majors

Academic majors	West Azeribaijan		Ilam		Semnan		Qom		Khuzestan		Mazandaran		Total		
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Total %
Agriculture extension	5	9.1	5	20.8	3	11.5	2	11.8	4	13.8	6	12.8	25	12.6	12.6
Agronomy	9	16.4	4	16.7	6	21.6	8	47.1	6	20.7	7	14.9	40	20.2	32.8
Rural development	1	1.8	-	-	2	7.7	-	-	-	-	1	2.1	4	2	34.8
Weeds	1	1.8	-	-	-	-	-	-	-	-	1	2.1	2	1	35.8
Forestry	2	3.6	-	-	-	-	-	-	-	-	1	2.1	3	1.5	37.3
Social sciences	1	1.5	-	-	-	-	1	5.6	1	3.4	3	6.4	6	3	40.3
Planning management	3	5.5	2	8.3	2	7.7	-	-	3	10.3	3	6.4	13	6.6	46.9
Livestock sciences	3	5.5	1	4.2	-	-	3	17.6	1	3.4	3	6.4	11	5.6	52.5
Geography	1	1.8	-	-	1	3.8	-	-	-	-	1	2.1	3	1.5	54
Economics	-	-	-	-	-	-	-	-	-	-	2	4.3	2	1	55
Horticulture	4	7.3	3	12.5	5	19.2	2	11.8	3	10.3	4	8.5	21	10.6	65.6
Crop products	4	7.3	2	8.3	1	3.8	1	5.9	1	3.4	1	2.1	10	5.1	70.7
Entomology	2	3.6	1	4.2	-	-	-	-	2	6.9	2	4.3	7	3.5	74.2
Soil sciences	4	7.3	2	8.3	2	7.7	-	-	3	10.3	1	2.1	12	6.1	80.3
Non-agriculture	3	5.5	1	4.2	-	-	-	-	2	6.9	3	6.4	9	4.5	84.8
Sociology	2	3.6	-	-	-	-	-	-	1	3.4	2	4.3	5	2.5	87.3
Plant protection	3	5.5	1	4.2	2	7.7	-	-	1	3.4	3	6.4	10	5.1	92.4
Irrigation	1	1.8	-	-	1	3.8	-	-	1	3.4	-	-	3	1.5	93.9
Plant breeding	3	5.5	1	4.2	1	3.8	-	-	-	-	-	-	5	2.5	96.5
No-response	3	5.5	1	4.2	-	-	-	-	-	-	3	6.4	7	3.5	100
Total	55	100	24	100	26	100	17	100	29	100	47	100	198	100	-

KMO and Bartlett's tests whose results showed the data were appropriate for factor analysis.

According to factor analysis, the three groups in the previous analysis were combined into one group which had the highest variance of determination (13.044%). The increase in yield (4.03%) was the last variable grouped by experts. Therefore, it can be said that experts believed that the improvement of human resource would increase production and yield,

Table 7: Prioritization of experts' viewpoints about future agricultural development status.

No	Future agricultural development status	Total			West Azeribaijan	Ilam	Semnan	Qom	Khuzestan	Mazandaran
		Mean	SD	Priority	Priority	Priority	Priority	Priority	Priority	Priority
1	Construction and improvement of rural roads	4.13	1.02	48	32	42	26	11	58	53
2	Construction of irrigation and drainage channels	4.42	1.11	50	2	39	24	40	57	52
3	Stores for the crop after harvest	4.23	1.29	56	43	58	54	38	42	59
4	Silos for the crop after harvest	4.38	0.98	39	27	43	43	37	43	30
5	Cold storage for crop after harvest	4.19	1.3	58	30	56	58	54	13	57
6	Application of machinery in cultivation and farm maintenance	4.41	7.8	20	34	22	40	9	6	41
7	Application of machinery in cultivation and farm maintenance	4.28	1.007	44	29	50	32	34	45	47
8	Application of machinery in harvest	4.28	1.1	52	51	46	50	58	8	27
9	Boosting rural handicraft	3.73	1.4	59	59	57	59	26	59	54
10	Crop products packaging industries	4.34	1.14	53	56	54	41	55	4	32
11	Crop products conversion industries	4.37	1.07	47	21	55	42	23	41	40
12	Social security insurance of farmers and their families	4.42	1.1	49	36	44	55	33	40	51
13	Insurance of the produced crops	4.48	1.01	40	50	31	1	57	3	31
14	Increasing yields of produced crops	4.32	0.78	21	10	38	39	22	23	35
15	Increasing cultivation area after increasing the production	3.87	0.88	41	45	35	46	39	55	33
16	Leveling of farming lands	4.44	0.66	5	12	19	22	14	5	13
17	Integration of farms and gardens	4.5	0.7	9	17	10	36	15	22	8
18	Restoration of farms and gardens	4.28	0.98	42	47	25	23	56	31	38
19	Access to appropriate chemical fertilizers in production	4.15	0.899	36	31	34	51	43	7	36
20	Access to appropriate bred seeds in production	4.45	0.898	30	24	13	25	52	18	25
21	Access to bred livestock	4.44	0.815	22	9	7	53	6	47	23
22	Access to appropriate chemical pesticides	4.57	0.68	6	3	20	3	29	21	15
23	Access to appropriate chemical pesticides	4.26	0.98	43	15	33	42	59	20	24
24	Farmers' access to loads and credits required for the production by relevant sectors	4.26	0.94	37	37	51	33	48	37	22
25	Farmers' access to modern irrigation methods	4.36	1.11	51	14	48	49	41	26	34
26	The use of modern informing systems (Internet) for coping with production-related challenges	4.05	1.26	57	54	59	45	44	36	58
27	Production and improvement of modern agriculture technologies in crop production	4.29	0.81	25	40	26	35	24	49	16
28	Supply of appropriate agriculture technologies to users	4.38	0.76	18	22	24	31	28	33	19
29	Farmers' access to new production technologies	4.41	0.89	2	19	47	28	10	17	44
30	Supply of information as to sales market to farmers	4.48	0.76	15	4	15	48	30	30	6
31	Establishment of cooperatives for the sale of crop products	4.26	1.03	46	43	37	34	51	54	46
32	Guaranteed purchase of agricultural products by government	4.53	0.72	10	5	11	20	31	39	5
33	Elimination or control of mediators and brokers in products purchase	4.63	0.8	17	1	41	2	13	16	48
34	Reduction or stoppage of the destruction of natural resources (soil, environment, etc.) by farmers	4.57	0.78	14	11	1	17	45	29	7
35	Sound use of water resources by farmers	4.59	0.95	32	8	40	12	50	32	55
36	Sound use of chemical fertilizers by farmers	4.51	0.72	11	38	16	19	7	27	11
37	Sound use of pesticides by farmers	4.55	0.68	7	7	21	9	25	12	14
38	Higher use of manure for farm strengthening	4.46	0.84	27	13	27	30	46	9	21
39	More attention to smallholders and female farmers	4.36	0.89	31	49	32	27	36	38	18
40	Establishment of production cooperatives for agriculture	4.16	1.18	54	39	53	29	49	56	56
41	Improvement of vocational trainings for farmers	4.35	0.81	24	46	29	37	19	52	12

Table 7: Prioritization of experts' viewpoints about future agricultural development status.

No	Future agricultural development status	Total			West Azeribaijan	Ilam	Semnan	Qom	Khuzestan	Mazandaran
		Mean	SD	Priority	Priority	Priority	Priority	Priority	Priority	Priority
42	Improvement of farmers' technical skills	4.34	1.03	45	57	45	21	27	53	43
43	Improvement of farmers' management skills for production stages	4.48	0.99	3	53	17	16	47	51	37
44	Access to extension and agriculture experts	4.63	0.64	38	6	12	15	1	46	1
45	Respecting farmers' self-esteem in society by institutions and agencies	4.69	0.58	1	2	14	14	3	15	4
46	Respecting farmers' self-esteem in society by public people	4.46	0.79	19	28	3	10	8	50	28
47	Ability to cope with production challenges by farmers	4.35	0.87	28	26	49	18	5	14	39
48	Improvement of farmers' creativity in crop production	4.4	0.84	26	44	2	5	4	48	45
49	Reduction of crop losses at harvest time through the application of harvest machinery	4.6	0.69	8	25	4	8	2	11	17
50	Reduction of the infestation of products to diseases	4.6	0.65	4	18	8	4	12	24	3
51	Reduction of the damages of pests to crops	4.6	0.64	2	16	9	13	17	25	2
52	Application of micronutrient fertilizers in crop production	4.49	0.94	33	41	23	47	21	34	49
53	Providing appropriate incentives for farmers by government to increase the motivation to produce	4.45	0.76	16	32	28	38	18	35	10
54	Higher income for farmers	4.55	0.74	12	20	6	6	16	44	9
55	Lower production costs for farmers	4.51	0.79	13	23	5	11	20	28	42
56	Higher purchase power for inputs and production resources by farmers	4.5	0.82	23	35	30	7	32	10	29
57	Out-of-farm vocational opportunities for farmers	3.98	1.17	55	58	52	56	53	19	50
58	Exportation of crop products	4.4	0.93	34	48	18	57	35	2	26
59	Diversified crop production by farmers	4.3	0.92	35	54	46	44	42	1	20
	Sample size	-	-	55	55	24	26	29	17	47

Table 8: Estimation of appropriateness of factor analysis for the data of future status of agricultural development.

Test	Value
KMO	0.787
Bartlett	980.26
Sig.	0.000

Table 9: Grouping of indicators of future agricultural development from experts' viewpoints

Factor	Variables	Specific value	Variance of specific value (%)	Total percentage in factors
Factor 1: Access to inputs, application of technologies for the development of human resource and sustainability	Use of bred cultivars, livestock and seedlings; how to use technologies; technologies to prevent destruction of natural resources; suitable application of pesticides and chemical fertilizers; improving soil fertility; vocational consultation; increasing management and technical skills and recommendations for coping with challenges	15.84	13.044	7.39
Factor 2: reduction of losses	Reduction of losses; reduction of infection to diseases and the losses by pests; sound use of water resources; application of micronutrients	5.3	11.352	5.74
Factor 3: economical development	Cutting of production costs; higher income; higher purchase power; creating vocational opportunities	4.2	9.7	3.85
Factor 4: improvement of infrastructures	Construction of roads, water channels, storage, silos, cold storage, conversion industries and handicraft industries	3.1	6.32	3.72
Factor 5: agricultural mechanization	Planting, cultivating and harvesting machinery	2.5	5.93	2.64
Factor 6: social status	Respecting farmers' self-esteem and fostering their creativity	2.01	4.67	2.55
Factor 7: improvement of marketing	Supplying information about sales markets; establishment of sales cooperatives; helping guaranteed purchase of crops	1.87	4.32	2.46
Factor 8: land reform	Leveling, restoration and integration of cultivating lands	1.8	4.18	2.41
Factor 9: yield increase	Yield increase; farms expansion	1.4	4.03	2.37

too. These nine groups explained 62.72% of total variance.

CONCLUSIONS

The studied agriculture experts including researchers, trainers and extension experts ranked the familiarity with extension activities as high and very high (64% of respondents). The highest frequency (81 people, 40.9%) was devoted to high familiarity with extension activities in agriculture sector. Only in Qom Province, experts evaluated this familiarity as being at moderate level.

The experts were, on average, 39.46 years old with the highest frequency being in age range of 36-40 (30.3%). Qom Province had the youngest experts (33.6 years old) and Khuzestan Province had the oldest ones (41.5 years old).

Of the studied experts, 171 ones (86.4%) were male and 25 ones (12.6%) were female. The highest number of females was found to be in Khuzestan Province (17.2%) and the lowest one in Mazandaran Province (6.4%).

The highest official working experience of the studied experts was in the range of 11-20 years (42.4%). About 18% had 1-5 years of working experience implying experts' appropriate and adequate experience. The experience can be useful in sound orientation of development process.

Average years of experience in working in farming section were 15.6 years among experts. This experience is adequate for farming activities. However, 35 experts (17.7%) had had no farming activities. They were mainly female experts or the experts in research centers. The highest farming background was in Khuzestan Province followed by Mazandaran Province and the lowest one was in West Azerbaijan Province.

A look at the academic major of experts show that the sub-discipline Agronomy had the highest frequency (40 people) followed by Extension

(25 people) and Horticulture (21 people). Interestingly, there were 30 experts with academic majors other than agronomy including art, planning management, sociology, geography and social sciences which were in charge of agriculture executive departments in provinces.

In the sample, 56.6% of experts had B.Sc., 37.4% had M.Sc. and about 6% had Associate degrees. So, experts' academic degrees were evaluated to be appropriate.

Most experts (64.6%) were members of social groups and 29.3% were not. In addition, 42.9% were members of findings acceleration plant as a new method of agriculture development and 50% were not. The remaining did not answer this question.

In terms of the contact of experts with farmers, 71% had high and very high contact with farmers. 24.7% had low contact with experts who were mostly researchers. This sort of contact was higher in Qom and Semnan Provinces than in other provinces.

In the prioritization of agricultural development stages in future, the first ranks were devoted to respecting farmers' social status, reducing the losses by pests and improving farmers' management skills. These priorities were the elimination of mediators and brokers in West Azerbaijan Province, reduction or stoppage of the destruction of natural resources in Semnan Province, insurance of produced crops, access to extension experts in Khuzestan Province and helping to respect farmers' self-esteem in Mazandaran Province.

Factor analysis of the variable relating to agricultural development (59 variables) showed that experts divided them in 9 classes; i.e., access to appropriate production inputs, the application of technologies, the development of human resources and sustainability, the reduction of losses, economical development, the improvement of infrastructures, agricultural mechanization, the improvement of famers' social status, the improvement of marketing, land reform, and the improvement of yield.

RECOMMENDATIONS

According to the results, the first group of future agriculture development indicators included access to appropriate production inputs, the application of technologies, the development of human resources and sustainability. Therefore, it is essential to do research to find appropriate production inputs, especially those based on regional climatic differences.

The development of human resources, also, was categorized in the first class as the highest factor explaining the variance. It shows the importance of training professional human resource for scientific and executive sectors and importance of focusing on farmers training to improve their technical and managerial skills. Thus, it is vitally essential to strengthen institutions in charge of developing agricultural human resource such as research, extension and training. This is an important factor in agricultural development.

Sustainability in agriculture sector was, also, a component of explanatory factors categorized in the first class. Unfortunately, ignoring sustainability in agricultural development injures agricultural sub-sectors, especially water and soil. Therefore, as one of the indicators agreed by experts, it should be paid attention in planning.

The reduction of losses in agriculture sector is another important indicator of agricultural development which was categorized in the second class by experts. The reduction of losses is relevant to all producing stages in which the cooperation of research, extension and training can play an important role. Therefore, it is essential for these three sectors to cooperate in formulating a sound plant.

The improvement of economical status in terms of cutting the costs of production inputs is another indicator of agricultural development. It is recommended to organize farmers in two types of cooperatives of input purchase and crop sale. Then, two indicators of the improvement of economical status and marketing would be enhanced continuously and sustainably.

The infrastructures have been already improved. However, a great part of infrastructures, particularly those related to water, are facing with crisis for which it is recommended to pay more attention to smallholders by providing facilities in the form of subsistence farming systems.

Mechanization of agriculture sector as an indicator of agricultural development is far from

ideal because of the small sizes and the wide distribution of farms for which it is recommended to unite the farms under the conventions agreed by exploiters.

REFERENCES

1- Berdegué, J.A., & Escobar, G. (2001). *Agricultural knowledge and information systems and poverty reduction*. AKIS Discussion Paper. Washington, DC: World Bank Report.

2- Consultative Group on International Agricultural Research (CGIAR). (2006). *Agriculture and environment, partnership for a sustainable future.* Washington: World Bank Report.

3- Dubois, D. D.(2002). *Competency-Based performance improvement: A strategy for organizational change*. Amherst, MA: HRD Press.

4- Johl, S, S. (2001). Determinants of agricultural development (Indian experience). Paper Presented at the Agriculture and National Development Conference. Tehran: Institute for Agricultural Economics Research Planning. 2007.

5- Miller, J. W. (2004). Role of agriculture in economical development: New findings from rapidly growing countries in agriculture sector. *Agriculture and National Development Conference.* Tehran, Iran: Agroeconomics Planning Research Institution. Ministry of Agriculture. 2008. *Access letter personnel experts.* Tehran: Bureau Job Switching, Ministry of Agriculture, FAO Report.

6- Navarro, M. (2006). How can agricultural extension educators contribute to a successful new green revolution. *Journal of Agricultural Education and Extension,* 12(2), 83-96.

7- North, D. C. (2001). Economic performance through time. *International Agricultural Development.* Tehran, Iran: Agroeconomics Planning Research Institution.

8- Perti, N. J. (2002). *Agriculture re-conceptualization: appropriate policies for sustainability and self-sufficiency.* (Translated by A. Kashani). Tehran: Village and Development Press, No. 46

9- Planning Research Institute of Agriculture and FAO Economics. 2006. Strategy framework of sustainable development of agriculture in Iran. Tehran: Institute for Agricultural Economics Research Planning.

10- Poor- Asadollah, A. (2002). *Agricultural extension and development process.* - Birjand: Birjand University.

11- Shahbazi, I. (2003). *Extension and rural development*- (2nd ed.). Tehran: Tehran University Press.

Shakoori, A.(2006). Planning and Agricultural Development in Iran. available on www. Critical Middle Eastern Studies. 15(3), 265–282.

12- Shakouri, A. (2005). *Agricultural development policies in Iran.* Tehran: Samt Press.

13- Sulaiman, R., & Van den Ban, A. W. (2003). Funding and delivering agricultural extension in India. Journal of International Agricultural and Extension Education, 10(1), 21-30.

14- Swanson, B. E., Bentzo, R., & Soufranku, F, A. (2002). Reform on agricultural extension. (Reza Movahedi and Karami Dehkordi, Trans.). Tehran: New Dehli University Press.

15- Tripathi, B. D. (2003). Agricultural extension personnel in new millennium: A prospective view. Retrieved from www.manage.gov.in/managelib, faculty, BDT (2). htm.

16- Van den Bon, A., & Hawkyns, H., P. (2007). *Agricultural extension.* (Mohsen Tabarayi and Zamanipur–Trans.) Mashhad: Ferdowsi University of Mashhad.

17- Verschoor, A. J., Van Rooyen, J., & D'Haese, L. (2005). New agricultural development criteria: a proposal for project design and implementation. *Development Southern Africa,* 22(4), 501-514.

18- World Bank– (2007). *Enhancing agricultural innovation: How to go beyond the strengthens of research systems.* World Bank. Washington DC.

19- Zamanipour, A. (2001). *Agriculture extension in development process.* Birjand, Iran: Birjand University Press.