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Analysis of Small-scale Commercial Integrated Agricultural Extension Barriers

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Abstract

Small-scale farmers face several obstacles to achieving small-scale integrated commercial agriculture. This study, in a descriptive-analytical method, investigates the barriers to small-scale integrated commercial agriculture. The statistical population involved all paddy farmers in Gilan province (N = 180106), andthe sample size (n=422) was determined using the Krejcie and Morgan table in stratified random sampling method. The research tool was a questionnaire whose validity was confirmed by a panel of experts, and its reliability was confirmed by Cronbach's alpha coefficient (0.89). Data analysis was performed by SPSS software and path analysis by Smart PLS software. The results of path analysis showed that the extension barriers have a direct effect on small-scale agriculture (β= 0.441) and integrated commercial agriculture (β= 0.401) and indirect effect on small-scale integrated commercial agriculture (β = 0.541) and indirect (β = 0.91). According to the t-value, the research hypothesis about extension barriers can be concluded that the effectiveness between independent and dependent variables was significant. Based on the results, the use of informed extension agents, reducing the non-extensional tasks of extension agents, and helping local organizations to reduce intermediaries are essential factors in removing obstacles to this type of agricultural system.

Keywords:
Extension barriers, integrated commercial agriculture, small scale farming, Gilan Province

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INTRODUCTION

The small-scale farming system has always been considered as an element of the traditional structure of Iran, in which each exploitation unit usually includes an exploiting family with activities such as agriculture, animal husbandry, horticulture, and industrial activities related to agriculture. Eighty percent of the world's farmlands are small and scattered, and the FAO has recently announced that arable land per capita is 0.12 ha for each person. According to the 2014 agricultural census results, agricultural exploiters in Iran are 4015,917 units operating on farmlands with an area of 16.6 Mha and the average per capita income of the country's agricultural exploitation level equal to 4.9 ha. The highest number of agricultural exploitations is related to units located in farmlands with one to less than two hectares. Gilan province with an average of 0.8 ha has the smallest farmlands in the country, while Zanjan province has the largest farmlands in the country with an average level of 10.2 ha (Savari et al., 2021). The small-scale farm plots and single-product agriculture in Gilan province have made farmers of the province unable to provide livelihood, so organizing this situation in the form of strategies to increase efficiency is required for economic planning in these areas. The agricultural sector is not able to rise income much due to limited and non-increasing land area, therefore, looking for other sources of income seems necessary according to the capabilities and resources of each region of the country to diversify the rural economy for enhancing the maintenance capacity of the rural population, i.e., the rural population sustainability (Yasouri & Javan, 2015). Diversity is critical to reducing poverty, whether at the family, community or country level. Today, the novel incentives for investment in rural areas can support a large part of valuable agricultural goods and services by establishing in a favorable environment for the diverse growth of rural household production (Dhanushkodi et al., 2017). Transferring from one type of capital and income to another is one of the important ways to increase and improve current and future livelihood situations and strategies. When there is diversity in livelihood strategies, the sustainability of natural resources as well as the sustainability of livelihoods of exploiting households are both guaranteed (Afrakhteh et al., 2015). Several studies suggested that an approach proposed today in the framework of sustainable rural development and economic sustainability of rural settlements is the approach of diversification of economic activities. It is generally believed that diversity is the foundation of agricultural sustainability, and the more diverse a system becomes, the more sustainable and dynamic it will be over time and in different places, not only against internal stresses but also against external stresses (Karimzadeh et al., 2018).

Small and medium-sized businesses have always been the main source of productive employment, preparation of the entrepreneurial environment, acceleration of creativity, innovation and opening up new business opportunities. The management of these businesses requires specialized knowledge and skills and the use of modern technologies to add value and continuously improve productivity and the quality of products and services to be offered to the market (Sharafi et al., 2018). Villages are environments with multiple resources and villagers also have assets that the sum of these assets and resources, shape their livelihood, but in most cases the exploitation is incomplete. To that end, rural poverty is today considered as one of the factors of instability in the utilization of resources due to the double pressure on resources. The real help to the poor rural people is not financial support for them, but the change in their livelihood. Fundamental measures should be taken to develop new methods of organizing activities, job diversity and utilization of resources with a prospective approach to reduce livelihood problems in rural areas (Pourghasem et al., 2019). As extreme poverty, endangering the livelihoods

of the villagers, the inability of the rural economy lead to increased vulnerability of the rural population, food insecurity, overuse of natural resources, as well as reduced welfare and household income, and labor migration. It also reduces the area under cultivation and consequently the country's dependence on imports, so it seems necessary to pay further attention to the diversity of livelihood of villagers (Abdpour, 2019). As a developing country, Iran has 65,000 villages with an estimated 22 million people living in rural areas. They live below the poverty line and their livelihood is directly and indirectly dependent on agriculture. Moreover, it is estimated that 27 percent of GDP, 9.22 percent of employment opportunities, 82 percent of food security, and 35 percent of non-oil exports are related to the rural economy (Ghambarali et al., 2013).

Javan et al. (2018) in a study show that villages have different capabilities in economic sectors, but they have not yet played an important role in regional development programs, and they also believe that the continuation of this situation will lead to more migration of productive labor, turning rural areas into dormitory quarters and weakening the economic performance of rural households. (Murendo et al., 2018) in their study reported lack of ownership, lack of access to facilities, limited access to extension staffs and low quality training courses associated with low participation of women in extension programs. According to (Chitsaz et al., 2019), the development of entrepreneurial businesses in rural areas has faced many obstacles and challenges, some of the most important of which include the lack of a proper business plan, lack of experience and expertise by villagers, lack of access to information and data resources, lack of funding for business investment and the existence of legal obstacles. (Anabestani & Tolabi Nejad, 2019; Chitsaz et al., 2019; Faghfory & Yaghoub, 2016) on low competitiveness of small farmers declared that small farmers are not able to compete with large production units due to insufficient facilities and discontinuous public sector support, high production costs, impossibility to upgrade facilities, poor transportation and low quality and non-standard products. Regarding the low tendency of rural youth to agriculture, studies of (Latopa & Abd Rashid, 2015; Yaghoubi & Zobeidi, 2018) show that the main reasons for migration or low incentive for rural youth to stay in rural areas are inequality of urban and rural development, higher education of youth, lack of economic employment in rural areas, high production risk, lack of incentive support for youth employment in agriculture and related industries in rural areas. (Wuni et al., 2017) concluded that some unemployed rural youth are not employed in the agricultural sector due to lack of motivations, including lack of interest and desire for farming, looking for a better job without any support from family and government, and challenges such as lack of sufficient capital, natural hazards in this sector, problems with access to land, continuing education, lack of knowledge on appropriate agricultural practices in the agricultural sector. In several studies on the obstacles and problems of the effectiveness of agricultural extension training courses from the perspective of farmers participating in training courses (Abedi et al., 2011; Ghaffari & Sami'ee; Najafabadi et al., 2009; Nazarzadehzareh et al., 2011), the results suggested that there were obstacles and problems such as not visiting farmers' farms by extension agents during extension periods and not using skilled and knowledgeable extension agents on agricultural issues and the multiplicity of tasks of extension agents. However, the presence of skilled extension agents through the technical and explanatory training can reduce the skill shortages in the relevant areas.

Some scholars (Azizi et al., 2017; Nmadu et al., 2015; Pappa et al., 2018; Wambura et al., 2015)concluded that the relationship between research, extension and farmer is limited to farm date and pilot farms. On the contrary, their involvement in setting up re-

search and extension programs such as identifying common problems and sharing technology is minimized. The results of a study (Binam et al., 2017) showed that the issue of distance to the pilot center may be as important as a policy and issue, what matters is not the physical distance, but what we might call the "economic distance" with small-scale farmers. Many villages are in poor condition, which negatively affects the role modeling of small-scale farmers from pilot farms. The results of some studies (Choobchian et al., 2017; Dhraief et al., 2018) on the reasons for farmers' resistance to the adoption of new technologies point out to the high age of farmers, low literacy, low income (limiting factor in access to new technologies) and, consequently, low risk of small farmers. Furthermore, the scarcity of production inputs, weak support services, high investment costs, lack of skilled manpower and neglect of technical and climatic issues have been other obstacles to the adoption of new technologies.

Arib, 2020 and Azizi et al., 2017 investigated the obstacles to rural women's engagement in social and economic activities in research. According to the results of the studies, the incompatibility of the content of the programs and extension classes with the needs of rural women, as well as the traditional customs and beliefs of the region are considered as the most important obstacles to women's engagement. (Amini & Taheri, 2017) in their research results reported the deprivation of economic and social opportunities as the most important obstacle to rural women's participation in economic activities. (Ahmadi et al., 2020; Hosseini, 2019) studied land divisions among heirs, dispersal and fragmentation, and the consequences of water wastage, problems with the use of machinery, and declining labor and capital productivity. In this regard, (Ehsanifar et al., 2018; Esfahani et al., 2019; Tavakkoli & Damanbagh, 2016) analyzed inappropriate policies and laws of small farmers. The results showed that small farm units cannot benefit from public sector support and credit policies due to numerous legal obstacles such as large units. According to studies of (Maziku et al., 2015; Namdar & Sadighi, 2013), inaccessibility to adequate infrastructure in rural areas – roads, banks, schools, etc. – has led to a decrease in the participation of small farmers in the market. (Osmani & Hossain, 2015; Sebatta et al., 2014) in their research stated the inability of farmers to access market information due to the long way to access the market and the lack of information and communication technology infrastructure, and analyzed the main reasons for the lack of full participation of small farmers in the market, which prevents their transfer to commercial farming. Studies of (Dhakshana & Rajandran, 2017; Musa et al., 2018) highlighted the most important problems of commercialization of small farmers' products, their integration into profitable markets and pervasive value chains by inaccessibility to market information, lack of easy access to modified seeds, low product quality and lack of storage capacity. (Morris et al., 2017) indicated that the development of rural multifunctional economy is not well-understood and recognized. Some farmers observe the knowledge and resources of the rural economy as ambiguous and demand the availability and recognition of entrepreneurial opportunities based on this strategic policy. Several researchers (Gaugler et al., 2020; Onder et al., 2011; Roy et al., 2013) in studies on the adverse effects of fertilizers and pesticides reported pollution from industrial estates, and chemical wastes from agricultural products. Because modern farming methods use a variety of chemicals such as fertilizers, pesticides, detergents and preservatives in large quantities. However, each of these chemicals has dangerous and unpredictable side effects such as toxicity to non-target organisms resulting in environmental imbalances. Various studies assessed the obstacles for small-scale commercial integrated agricultural extension. This indicates that different regions have economic, social,

environmental, educational and infrastructural problems and obstacles depending on the type of products. Therefore, it is important to explore the obstacles in each region for policy-making and planning projects in that region. As the strategic rice crop is the second grain to be fed in the country and the first in Gilan province, the study and analysis of obstacles to the small-scale commercial integrated agricultural extension is original and novel in its turn.

As we have overviewed the underlying theory for each of the model's primary constructs, SSCIF (Small Scale Commercial Integrated Farming), Extension obstacles and their factors we can now develop each construct, discuss their relationships, and list the associated goals for our research model (Figure 1).

This study aims to evaluate the direct and indirect effects of obstacles of small-scale commercial integrated agricultural extension in Gilan province, mediated by small-scale farming and commercial integrated farming. In fact, this study seeks to respond the following question: what are direct and indirect obstacles to small-scale commercial integrated farming and to what extent?

METHODOLOGY

The statistical population of this study consisted of all small-scale farmers in Gilan province. Small-scale farmer in this study refers to head-of-household farmers who have farmlands <3 ha according to the FAO definition (Bennett et al., 2001), and in addition to rice cultivation are engaged in several agricultural side projects and related industries in the rural household unit. According to the statistics of the Planning and Budget Organization of Gilan Province, there are 180.106 rural households eligible to implement small-scale commercial integrated farming (Statistical Center of Iran Database, 2014). The statistical population of the study was selected among paddy farmers in Gilan province. The data collection tool of the questionnaire consists of three parts in Likert scale: (I) the individual characteristics of the studied farmers, (II) their job characteristics, and (III) the independent variables including extensional obstacles affecting small-scale commercial integrated farming (33 items) (VI) also, integrated commercial agriculture and small agriculture variables as mediating variables (15 items). Experts' opinions were used to evaluate the validity of the research tool and Cronbach's alpha of the variable of obstacles affecting small-scale commercial integrated farming was measured to ensure its reliability, which calculated to be 0.89 that is at an acceptable level. (Krejcie & Morgan, 1970) table was used to evaluate the appropriate sample size due to the unavailability of variance in the study population and the confidence level, based of which the sample size

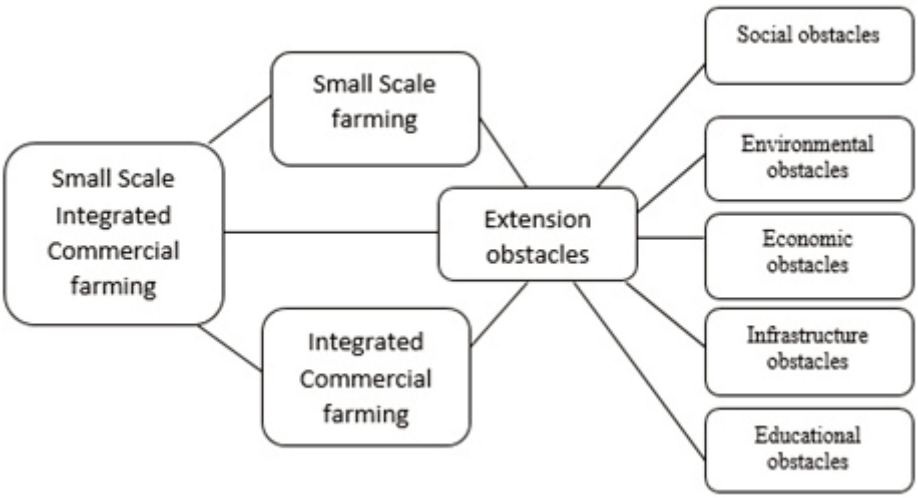

Figure1. Conceptual Model of Research

of 384 people was determined; 15 percent was also added to the sample size for more certainty, which finally 422 questionnaires were entered into the analysis that the sample size was extracted by Stratified method (Table 1). This questionnaire was prepared based on a five-point Likert scale from very appropriate to very inappropriate. SPSS/Win software was used to analyze the collected data, as well as linear and multiple regression were used to test the hypotheses. This task was performed in descriptive statistics such as measures of frequency (frequency...); measures of central tendency (mean...); measures of variation (standard deviation...). In the analytical section, multivariate statistical methods are used to analyze the joint behavior of more than one random variable. There is a wide range of multivariate techniques available, that use them to derive linear combinations of multiple quantitative variables that explain the largest percentage of the variation amongst those variables. The Smart PLS was used to investigate the direct and indirect effects of the independent variable on the dependent variable. The structural equation model (SEM)extracted from PLS, is one of the most useful models based on the sum of squares.

In this study, exploratory factor analysis (EFA) followed by PLS analysis was performed to analyze the validity of model structures and their relationships. PLS is proper for analyzing highly intricate prediction models with multi-item structures and direct and indirect paths. PLS analyzes the external measurement model to determine the general psychometric properties of the scales used to measure the model variables and the internal structural model to determine the important relationships among variables (Gefen et al., 2011). PLS is calculated as VB-SEM correlation between structures and variables or their measured or observed items (measurement models) and linear regressions are drawn between structures (structural models). These PLS aspects are of particular importance because our measures rely on ordinary data, which may not have homogeneous and normal requirements.

Since PLS is a non-parametric procedure, we used bootstrapping to test the loading sig-

Table 1

Statistical Population and Sample Size of Research by Each City (Number of Paddy Farmers by County)

No.	City name	No. of farmers in each city	Sample size (n)
1	Astara	2498	6
2	Astaneh Ashrafiyeh	15572	38
3	Amlash	3656	9
4	Anzali	2015	5
5	Talesh	14825	36
6	Rasht	28762	71
7	Rezvanshahr	8475	21
8	Rudbar	3200	8
9	Rudsar	11944	29
10	Siahkal	3754	9
11	Shaft	9649	24
12	Someh Sara	20009	49
13	Fuman	12180	30
14	Lahijan	24484	60
15	Langarud	12782	31
16	Masal	6301	16
Total		180106	442

Source: (Sanjary, 2016)

nificance. The t-statistic for loading measuring items on their embedded structures was all significant at 0.05 level, except in the case of industrial structure. However, we kept it because it is close to certain and is considered significant. Further validation analysis using PLS confirmed this decision. Cronbach's alpha also provides evidence of composite reliability, with values >0.85 indicating sufficient.

Two tests were used for discriminant validity: (I) comparison of item-loads with item-cross-loads and (II) comparison of the variance extracted from the structure with the common variance. Each item must be loaded on the desired structure more than other structures. We find that all of our items meet these conditions. The third step is the SEM (Structural equation modeling)

Distinctive validity (DV) assessment, which is understood as an independence indicator of structures or latent variables (Hair Jr et al., 2014). For this study, the cross-loading observation method of indicators with higher factorial load in the relevant LV than the others were used (Chin, 2001).

RESULTS

According to demographic analysis, 22 percent of the respondents had at least a bachelor's degree and only 5 percent were illiterate. Seventy-two percent (72%) of the studied farmers had lands between 1 and 3 ha and only 4 percent of the respondents had lands >3 ha. Seventy percent (70%) of the respondents had participated in at least one extension training course, which indicates a high level of education and appropriate extension training, and also indicates that more than 70 percent of respondents are small-scale farmers. According to (Table 2), it can be concluded that the most basic indicators of obstacles to small-scale commercial integrated farming in the current situation are educational factor, lack of manpower, multiplicity of non-extension tasks of extension agents, lack of extension agents' belief in integrated farming and social factor, low modeling indices of pilot farms, multiple intermediaries from production to consumption and farmers' resistance to new acceptance and economic factor, indicators of impossibility of supplying primary production inputs, lack of mechanization due to small farms and low participation of farmers; in the infrastructure factor, indicators of natural hazards of agricultural activities, restrictive administrative and social structures and problems related to rent and property; and in the environmental factor, indicators of pollution from industrial estates, pollution from pesticides and agricultural pests and pollution caused by unsanitary disposal of waste from agricultural production units were rated from first to third. Furthermore, according to a general comparison among the five variables of obstacles to integrated farming presented in (Table 3), the results show that the economic factor is the main obstacle followed by the educational and social factors, respectively.

Data analysis

In the data analysis section, the average variance extracted (AVE) indicates the variance of a structure through its items relative to the variation level due to measurement error. The results showed that each variance of the extracted structure was more than the recommended value of 0.5. Therefore, we concluded that all structures have the desired convergence validity (Table 4).

According to the analysis presented in (Table 4), it is obviously indicated that the loads of dimensions of obligations and obstacles in the main structures are always higher than the others, i.e., the model has differential validity based on the criteria of (Chin, 2001)(Table 5).

Second, the variance of an extracted structure, or the common variance between the structure and its items, must be greater than the common variance between the structure and other structures. This comparison was measured by comparing the square root of AVE with its correlation with other structures. It was observing that the square root

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Table 2

Central Tendency and Variation Indicators of Extensional Barriers

No.	Indicators	Mean		SD		CV		Rating	
		Current state	Optimal state	Current state	Optimal state	Current state	Optimal state	Current state	Optimal state
	Educational obstacles								
1	Multiplicity of non-extension tasks for extension agent	2.96	3.61	1.14	1.15	38.51	31.85	2	1
2	Lack of skilled manpower	3.04	3.68	1.16	1.19	38.15	32.33	1	2
3	Low incentive of extension agents in providing expert services	2.87	3.57	1.16	1.18	40.41	33.05	4	5
4	Weak relationship between extension and research	2.92	3.65	1.22	1.2	41.78	32.88	7	4
5	Low flexibility of extension agent towards the farmer	3.07	3.62	1.25	1.19	40.71	32.87	5	3
6	Lack of a program for youth participation in the implementation of integrated farming	2.86	3.51	1.26	1.23	44.05	35.04	8	8
7	Lack of a plan for women's participation in the implementation of integrated farming	2.89	3.59	1.19	1.19	41.17	33.14	6	6
8	No belief of extension agent in integrated farming	2.96	3.61	1.19	1.20	40.20	33.24	3	7
	Social obstacles								
9	Multiple intermediaries from production to consumption	2.85	3.64	1.19	1.15	41.75	31.59	2	3
10	High age of farmers	2.80	3.58	1.19	1.17	42.5	32.68	4	4
11	Low literacy of farmers	2.82	3.63	1.25	1.23	44.32	33.88	6	6
12	Low modeling of pilot farms	2.86	3.68	1.18	1.15	41.25	31.25	1	2
13	Farmers' resistance to accepting new findings of integrated farming	2.85	3.71	1.20	1.11	42.10	29.91	3	1
14	No flexibility of the public sector in updating technologies and upgrading scientific and technical capacity	2.84	3.56	1.22	1.19	42.95	33.42	5	5

SD, Standard deviation; CV (Coefficient of variation).

Table 2
Continued

No.	Indicators	Mean		SD		CV		Rating	
		Current state	Optimal state	Current state	Optimal state	Current state	Optimal state	Current state	Optimal state
	Economic obstacles								
15	Low participation of farmers in integrated agricultural extension	2.97	3.59	1.24	1.16	41.75	32.31	3	4
16	Low risk of small farmers	2.83	3.60	1.22	1.15	43.10	31.94	6	2
17	Low per capita consumption of fish in the community	2.81	3.58	1.23	1.19	43.77	32.24	8	3
18	Consumer vs. Farmer	2.79	3.61	1.24	1.14	44.44	31.57	9	1
19	Market vs. Government	2.80	3.53	1.21	1.15	43.21	32.57	7	6
20	Limited access to land	2.84	3.54	1.19	1.20	41.90	33.89	4	8
21	Lack of product transportation infrastructure	2.81	2.65	1.19	1.28	42.34	35.06	5	9
22	Impossibility of supplying primary production inputs	2.87	3.55	1.1	1.15	38.32	32.39	1	5
23	No mechanization due to the small size of farms	2.83	3.52	1.14	1.16	40.28	32.95	2	7
	Technical infrastructural obstacles								
24	Natural hazards from agricultural activities	2.75	3.62	1.12	1.10	40.72	30.38	1	1
25	Poor infrastructure supports	2.68	3.57	1.21	1.15	45.14	32.21	5	3
26	Inappropriate Policies and Laws	2.85	3.67	1.27	1.13	44.56	30.79	4	2
27	Restrictive administrative and social structures	2.82	3.63	1.21	1.16	42.90	31.95	2	5
28	Problems related to rent and land ownership	2.86	3.65	1.23	1.16	43.00	31.78	3	4
29	No identity of manufactured products	2.79	3.60	1.29	1.21	46.23	33.61	6	6
	Environmental obstacles								
30	Pollution from industrial towns	2.98	3.59	1.26	1.21	42.28	33.70	1	1
31	Unsanitary disposal of domestic sewage	2.94	3.52	1.30	1.23	44.21	34.94	4	4
32	Pollution caused by unsanitary disposal of waste of agricultural production units	2.95	3.53	1.28	1.22	43.38	34.56	3	3
33	Pollution caused by agricultural pesticides	2.96	3.64	1.27	1.24	42.90	34.06	2	2

SD, Standard deviation; CV (Coefficient of variation).

Table 3
Results of Comparison of Factors of Integrated Agricultural Barriers

Dimension	Factor	Mean		SD		CV		Rating	
		Current state	Optimal state	Current state	Optimal state	Current state	Optimal state	Current state	Optimal state
Obstacles	Educational	2.94	3.60	0.947	0.913	32.21	25.36	2	4
	Social	2.83	3.63	0.967	0.911	34.16	25.09	3	3
	Economic	2.91	3.57	0.867	0.886	29.79	24.81	1	1
	Technical infra-structural	2.79	3.62	0.979	0.905	35.08	25	4	2
	Environmental	2.94	3.56	1.11	1.05	37.75	29.49	5	5

Table 4
Structural Reliability and Validity

	Cronbach's Alpha	rho_A	Composite reliability	AVE
Technical infrastructure obstacles	0.915	0.916	0.934	0.702
Educational obstacles	0.902	0.903	0.921	0.594
Social obstacles	0.884	0.887	0.912	0.634
Economic obstacles	0.933	0.934	0.944	0.653
Extension obstacles	1.000	1.000	1.000	1.000
Environmental obstacles	0.902	0.903	0.931	0.773
Commercial Integrated Farming	1.000	1.000	1.000	1.000
Small-scale farming	1.000	1.000	1.000	1.000

AVE: Average variance extracted.

Table 5
Model Identification Criteria

	AIC	AICu	AICc	BIC	HQ	HQc
Technical infrastructure obstacles	-133038	-131018	-31786	-127848	-130938	-13681
Educational obstacles	-98774	-96753	2479	-93583	-96674	-96417
Social obstacles	-117816	-115797	-16563	-112626	-115716	-115459
Economic obstacles	-157901	-155880	-56648	-152711	-155801	-155544
Environmental obstacles	-117089	-115068	-15836	-111899	-114989	-114732
Commercial Integrated Farming	-14832	-12812	86420	-9642	-12732	-12476
Small-scale farming	-18720	-16700	82532	-13530	-16621	-16364
Small-scale commercial integrated farming	-97413	-93330	4232	-87033	-93213	-92426

AIC, Akaike's Information Criterion; AICu, Unbiased Akaikes Information Criterion; AICc, Corrected Akaikes Information Criterion; BIC, Bayesian Information Criteria; HQ, Hannan Quinn Criterion; HQc, Corrected Hannan-Quinn Criterion.

of AVE is significantly larger than its correlation with other structures for each structure (Table 6). As a result, our structures show adequate discriminatory validity.

PLS structural model results

The total justification power of the structural model, the value of variance explained by the independent variables, and the size and strength of its paths were assessed, indicating that each hypothesis is related to a structural model path. R^2 was used to measure the explanatory power of the model as interpreted for regression analysis. The diversity must exceed 10 percent to qualify for appropriate interpretation (Table 7) and (Table 8). The analysis showed that the structural model explains about 35 percent of the variations in small-scale commercial integrated farming (SSCIF), which indicates that the structural model provides sufficient explanatory power. Bootstrap with 200 replicates was used to obtain t-statistics to test the statistical significance of the model paths/relationships. (Ideally, Paths should be ≥0.2, have significant statistics, and meet expectations in terms of direction).

The path between extension and small-scale farming obstacles was significant (t = 1.304, p = 0.021), which fully supports hypothesis 1 (there is a direct significant relationship between extension obstacles and small-scale farming according to the studied farmers). The path between the factors of extension obstacles and commercial integrated farming was not significant (t = 1.918, p = 0.042), which does not confirm hypothesis 2 (there is no direct significant relationship between extension obstacles and commercial integrated farming from farmers' perspective). Finally, the general hypothesis (there is a direct and indirect significant relationship between extension obstacles and small-scale commercial integrated farming from farmers'

Table 6
Latent Variable Covariance

Row	Technical infrastructure obstacles	Educational obstacle	Social obstacles	Economic obstacles	Extension obstacles	Environmental obstacles	Commercial Integrated Farming	Small-scale farming	Small-scale commercial integrated farming
Technical infrastructure obstacles	1.000	0.530	0.597	0.779	0.864	0.741	0.306	0.350	0.409
Educational obstacles	0.530	1.000	0.727	0.574	0.801	0.594	0.289	0.359	0.480
Social obstacles	0.597	0.727	1.000	0.760	0.840	0.507	0.535	0.527	0.563
Economic obstacles	0.779	0.574	0.760	1.000	0.896	0.682	0.380	0.379	0.410
Extension obstacles	0.864	0.801	0.840	0.896	1.000	0.838	0.406	0.444	0.518
Environmental obstacles	0.741	0.594	0.507	0.682	0.838	1.000	0.227	0.282	0.350
Commercial Integrated Farming	0.306	0.289	0.535	0.380	0.406	0.227	1.000	0.923	0.710
Small-scale farming	0.350	0.359	0.527	0.379	0.444	0.282	0.923	1.000	0.784
Small-scale commercial integrated farming	Technical infrastructure obstacles	Educational obstacle	Social obstacles	Economic obstacles	Extension obstacles	Environmental obstacles	Commercial Integrated Farming	Small-scale farming	Small-scale commercial integrated farming

Table 7
R^2 for Research Variables

Variables	R^2	Adjusted R^2
Technical infrastructure obstacles	0.747	0.744
Educational obstacles	0.642	0.639
Social obstacles	0.705	0.702
Economic obstacles	0.803	0.801
Environmental obstacles	0.703	0.700
Commercial Integrated Farming	0.165	0.156
Small-scale farming	0.197	0.189
Small-scale commercial integrated farming	0.641	0.652

Table 8
The Variance of the Sum of Squares of the Research Variables

Variables	Technical infrastructure obstacles	Educational obstacles	Social obstacles	Economic obstacles	Environmental obstacles	Commercial Integrated Farming	Small-scale farming	Small-scale commercial integrated farming
Economic obstacles	2.951	1.795	2.388	4.079	2.363	0.197	0.245	0.103
Commercial Integrated farming								0.003
Small-scale farming								0.243

perspectives) was confirmed, therefore, extension obstacles had a direct effect on small-scale farming and commercial integrated farming and has had a direct and indirect positive effect on small-scale commercial integrated farming. The results show that there is a direct and indirect path of concurrence between small-scale commercial integrated farming and extension obstacles. As the literature and research model suggested, one of the conditions for mediating factors is the presence of both direct and indirect paths. Since there was a direct Path between small-scale commercial integrated farming and extension obstacles, small-scale farming and commercial integrated farming were mediators (Figure 2).

Model of Direct and Indirect Relationships Between Research Variables Based on Research Hypothesis

Finally, the total model adjustment index should also be evaluated. Fitness is actually the geometric mean (square root resulting from two indicators) between the mean R^2 (goodness of fit of the structural model) and the mean weight of AVE (goodness of fit for the measured model). (Wetzels et al., 2009), suggested that 0.30 level is sufficient for the social and behavioral sciences. Therefore, by performing this calculation with that value, we obtain 0.307, which indicates the model goodness of fit. When the fitness quality assessment is low, we provide an interpretation of the path coefficients (Table 10). These are interpreted in such a way that the "β" of simple or ordinary linear regressions, for example, between obstacles of commercial integrated farming, is the value of 0.641, indicating that the SCM improvement, commitments, is 0.337.

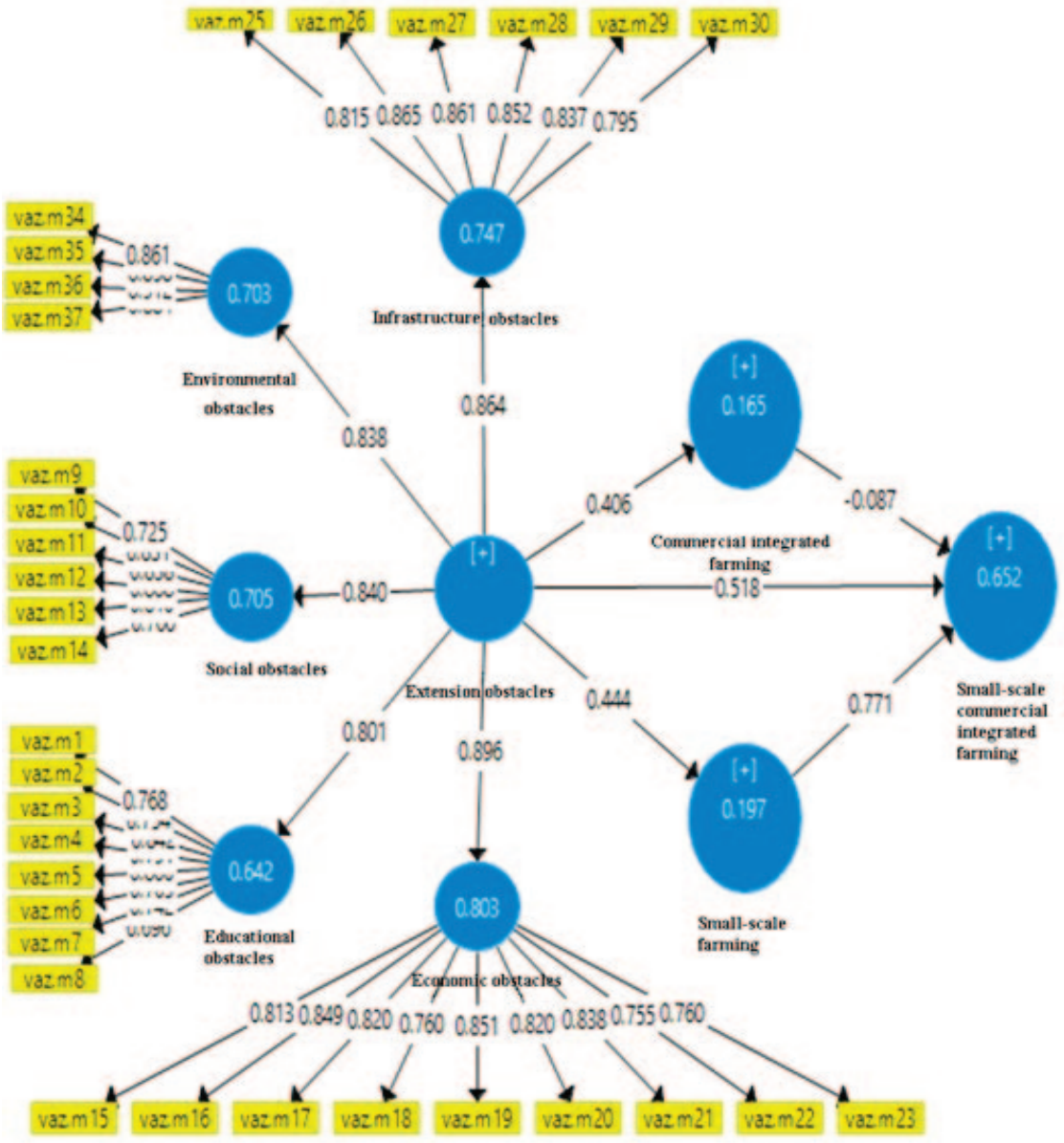

Figure 2. Confirmation Results of the Final

Table 9
Model Fit of Goodness

	Standard model	Estimated model
SRMR	0.066	0.097
d_ULS	3.080	6.582
d_G	94,576	104,646
Chi-Square	3,996,838	4,392,470
NFI	0.425	0.368
rms Theta	0.153	

Table 10
Path Factors

	Technical infrastructure obstacles	Educational obstacles	Social obstacles	Economic obstacles	Environmental obstacles	Commercial Integrated Farming	Small-scale farming	Small-scale commercial integrated farming
Extension obstacles	0.864	0.801	0.840	0.896	0.838	0.406	0.444	0.518
Commercial Integrated farming								0.387
Small-scale farming								0.771
								Indirect effect
Extension obstacles → Commercial integrated farming → Small-scale Commercial integrated farming								0.336
Extension obstacles → Small-scale farming → Small-scale Commercial integrated farming								0.342

DISCUSSION AND CONCLUSION

In the present study, the most important components of 5 economic, educational, social, infrastructural, and environmental obstacles affecting as independent variables on the research dependent variable (small-scale commercial integrated farming) are analyzed from the perspective of sample farmers.

Economic obstacles

In the economic obstacle, the indicators of impossibility of supplying primary production inputs, the lack of mechanization due to the small size of farms, and the low engagement of farmers in extension integrated farming have the highest rate based on the calculated variation factors. The obstacle of impossibility of supplying primary production inputs is evaluated in the highest rate and is the most important obstacle for commercial integrated farming, which is consistent with the studies of (Anabestani & Tolabi Nejad, 2019) and (Hosseini, 2019) and The obstacle of no mechanization due to the small size of farms in the current situation is in second place, which is consistent with the studies of (Namdar & Sadighi, 2013), (L. Sharafi et al., 2018) who consider this problem as a complication of land fragmentation. And the third obstacle is the low engagement of small farmers in extension integrated farming due to limited access to financial resources, which is consistent with the findings of (Latopa & Abd Rashid, 2015), (Nuhoglu & Nuhoglu, 2007) on land inaccessibility and poor public financial support from small farmers.

Educational obstacles

Indicators of lack of skilled manpower, multiplicity of non-extension tasks of extension agents and non-belief of extension agents in integrated farming have the highest rate based on the variation factors calculated as educational obstacles. Regarding the obstacle of the lack of skilled manpower, (Najafabadi et al., 2009) and emphasized as one of the main problems in accepting innovation. Regarding the obstacle to the multiplicity of non-extension tasks of extension agents, (Abedi et al., 2011) and (Ghaffari & Sami'ee, 2007) emphasized the illegal responsibilities and employment of extension agents in non-extension affairs in their research results. Moreover, on the obstacle of the extension agents' disbelief in the farmer, (Najafabadi et al., 2009) confirmed this issue in their studies.

Social obstacles

In the social obstacles, indicators of low modeling of pilot farms, multiple intermedi-

aries from production to consumption and farmers' resistance to accepting new findings of integrated farming have the highest rate based on the calculated variation factors. In the case of the first obstacle, i.e., low modeling of pilot farms, (Binam et al., 2017) in their research pointed out the significance of economic distance between small farmers and pilot farms, which is consistent with the findings of the present study. For the second obstacle, i.e., multiple intermediaries from production to consumption, this result is consistent with the studies of (Chitsaz et al., 2019) and (Anabestani & Tolabi Nejad, 2019). And the third obstacle, i.e., farmers' resistance to accepting new findings, according to (Dhraief et al., 2018) and (Choobchian et al., 2017), the main reasons for farmers' resistance to accepting new findings are poor extension performance, investment risk and unsuccessful experience of farmers in the area.

Infrastructure obstacles

In the technical infrastructure obstacles, indicators of natural hazards of agricultural activities, restrictive administrative and social structures, and problems related to rent and land ownership have the highest rate based on variation factors. (Wuni et al., 2017) confirmed the first obstacle, i.e., the natural hazards of agricultural activities. For the second obstacle, i.e., the restrictive administrative and social structure, (Namdar & Sadighi, 2013) and (Hosseini, 2019) in their studies raised administrative and managerial challenges as limiting factors, especially for women's engagement. The third obstacle, which is the problems of land rent and ownership, is consistent with the studies of (Tavakkoli & Damanbagh, 2016) and (Ahmadi et al., 2020) on the gradual fragmentation of lands as a result of hereditary division and mechanization problems.

Environmental obstacles

Indicators of pollution caused by industrial estates, pollution caused by agricultural toxicities and pesticides, and pollution caused by unsanitary disposal of waste from agricultural production units are in the first to third rate of environmental obstacles, which were of the greatest importance from the perspective of sampled farmers. These results have been emphasized in the studies of (Sharma & Singhvi, 2017), (Gaugler et al., 2020),(Roy et al., 2013), and (Onder et al., 2011).

Finally, in testing the hypothesis between extension barriers and small-scale commercial integrated agriculture, which was performed using path analysis, the results showed that in the economic factor as the most effective barrier, indicators of "impossibility of supply input, lack of mechanization of small-scale farms, low participation" "Farmers" in the current situation and the indicators of "consumer versus farmer, low risk of farmer and low per capita consumption of fish in the community" in the desired situation, had the greatest impact, which is confirmed by the results of the research hypothesis at an error level of 5%. The existence of correlation between hidden variables with visible variables is acceptable. Also, in examining the model, it was observed that it has a good fit. According to the results obtained in this study, the recommendations are following.

Recommendations

The findings of each study are influenced by the circumstances in which the research is conducted. Due to the limited research work in the field of small-scale integrated commercial agriculture in Iran, in the preparation of research resources, especially in the field of student dissertations and research articles, the existence of library resources is used in part of the present study. Also, according to the audience of this study - farmers with different levels of willingness to participate - the possibility of access and use of their opinions is very limited and required a lot of effort to interact with farmers. In this regard, and considering the limitations expressed and the results of the research, the following

suggestions are presented:

Reducing the non-extension tasks of extension agents, increasing their skills, and employing flexible extension agents who are interested in small-scale commercial integrated farming will contribute to the extension of this type of agricultural system.

Organizing rural youth and women in the form of local organizations can reduce and minimize multiple intermediaries from production to the consumer market by providing production inputs, producing support-oriented safe products, and direct supplying products to consumer markets.

Extension and development of local aquaculture cooking festivals to help increase per capita consumption of fish as a healthy protein available to villagers can be effective in increasing per capita consumption of fish and contribute employment and rural household economy.

Simplifying the rules for low-interest and long-term banking facilities to help villagers by accepting guarantees of their assets will be effective in accepting the implementation of small-scale commercial integrated farming.

Reorganization of available research and extension services creatively can solve farmers' problems by adopting participatory approaches. In addition, the application of media including television, radio, print, electronic media and the development of joint research, technical and specialized content sharing, joint visits, exhibitive farms, exhibitions, conferences and workshops, and training seminars in the framework of a dynamic and effective communication mechanism are also effective to facilitate the extension plan.

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