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Factors influencing sustainability of horticultural private extension services

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Abstract

The present study aimed at evaluating prominent factors that affect the sustainability of horticultural private extension services (SHPES) and the continuous flow of their activities from the perspective of public sector experts. The study sample consisted of 148 public sector experts selected through stratified random sampling. A questionnaire was utilized for data collection. Validity was confirmed by face validity, convergent validity and content validity. The results showed that infrastructure, educational extension and economic factors had the most positive and significant effects on the SHPES and the continuity of their activities. The result of the calculated goodness-of-fit index (0.718) revealed that the model provided an excellent fit for the data. Also, the structures and factors explained 78% of the variance of the SHPES. The present study's results showed how management, economic, sociocultural, policy, infrastructure, and educational factors influence SHPES.

Key words: Educational extension, extension performance, sustainability, public extension services, private extension services

Introduction

The government has always considered the horticultural sector as an effective factor in the economic development of countries (Esfandiari et al., 2016). Agriculture is one of the largest sectors in which the lifestyles and economies of countries are interconnected. In such a context, development policies and expansion of the horticultural sector can entail substantial benefits and economic progress. This can be especially true in the case of rural areas and among small farmers (Mortazavi and Kiani, 2019). In Iran, the horticultural sector has an important role in the micro and macro economy of the country (Farajpour et al., 2011; Ebrahimi et al., 2012). According to the Central Bank, in 2017, Iranian agriculture comprised 10% of the national GDP. Also, according to the same report in 2017, about 22% (20 million people) of Iran's population live in rural areas, while villagers make up about 50% of the labor force in the horticultural sector. These small farmers and their households face extensive limitations on facilities and conditions for development, compared to urban areas, even though almost half of the food in Iran is produced by the rural sector and the other half is imported (Omidpour et al., 2019). Some of the limitations that villagers face can be traced back to shortcomings in policy and planning, economic affairs, cultural aspects, support, education and infrastructure, all of which can be addressed through laws and correct enforcement (Esfandiari et al., 2016). A big limitation is a lack of education among farmers and their limited access to information, a solution of which is to expand extension counseling (Anang et al., 2020).

Horticultural extension services and systems usually comprise a set of instructions and advertisements that are aimed at rural populations. In particular, they aim to render horticultural activities optimum while maintaining sustainability in natural

ecosystems and resources, e.g., water, soil and genetic diversity. It is characterized by a service-educational nature that aims at increasing horticultural production and income while raising social and educational standards among farmers by improving their horticultural methods and techniques (Alizadeh et al., 2018). Some experts believe that promoting agriculture through public sector agencies, as one of the main components of horticultural development, has not realized its full potential (Swanson and Rajalahti, 2010; Pretty et al., 2011). Accordingly, the provision of extension services in recent years has been associated with many challenges, especially in developing countries (Anang et al., 2020). After years of spending large budgets to expand government extensions in many underdeveloped countries, the actual achievements of extension services have been very little (Pretty et al., 2011). Even where horticultural extension services are available, many smallholder farmers may be reluctant to use them because the services do not fit their needs (Siddiqui, 2012). Some researchers believe that extension services are poorly established because of inappropriate methods, deficient enforcement policies, insufficient staff in the extension system and a lack of necessary facilities and supplies (Agbarevo, 2013). There is ample room for pertinent questions on the achievements of the horticultural extension system in Iran after eight decades of activity since its establishment in 1948. Less than half of its plans have been hardly achieved in various fields (Safi et al., 2014; Karimi-Gougheri et al., 2018) and there have been relevant challenges in up-regulating the said systems concerning the factors that can encourage farmers to employ expert advice (Alizadeh et al., 2018). In general, criticisms of the promotion of the Iranian public sector center around the need to meet a vast range of conditions in the horticultural population, most of whom are deprived of effective extension services, severe economic limitations, lack of facilities, equipment and personnel in government extension organizations and institutions (Hosseini and Sharifzadeh, 2018), have made the government reconsider its policies repeatedly.

Over the past several years, experts have faced limitations and challenges regarding the orientation of the private sector towards farmers, along with its lack of attention to traditional knowledge and the regulation of sustainable development for natural resources. In some rural areas, there is a lack of support for farmers at times of crisis, which can be associated with a lack of legal framework and government support for private extension institutions. This sometimes leads to a limited flow of information between organizations and farmers (Din Panah et al., 2009; Safi et al., 2014; Sharifzadeh and Moradnejad, 2020). Comparative analysis of the role of public and private agricultural extension organizations on adopting agricultural innovations in the Tarom Township, Zanjan Province has been reported (Din Panah et al., 2009; Safi et al., 2014; Sharifzadeh and Moradnejad, 2020. But the question remains as to why experts have not managed to penetrate the depths of the practical farming area and why farmers have not applied expert services to benefit from scientific progress. With these interpretations, it seems that private attempts at promotion have not achieved the success they deserve and are continuing to face challenges. For example, from 2004 to 2011, many consulting service companies were established in Qazvin and Zanjan provinces. Specifically, the Qazvin province had 48 companies with 170 experts and the Zanjan province had 42 companies with 115 experts. But after a few years, many of these companies were dissolved or inactivated for various reasons. In this field, there have been no comprehensive studies on factors that affect the maintenance, improvement and sustainability of private extension activities. Therefore, the present study examined the factors affecting the sustainability of private extension in Zanjan and Qazvin provinces. The results could offer ways for the horticultural extension system to expand the sustainable presence of the private sector. Zanjan and Qazvin provinces were selected for this study based on their ease of accessibility to relevant information. There was a need for direct and complete access to the zoning system, although security issues potentially barred the public from such classified information.

So far, many studies have sketched connections between the privatization of horticultural extension services and the requirements of its actualization, as well as factors affecting its sustainability and continuity. Alizadeh et al. (2018) reported from an expert viewpoint on extension services, and they stated several of the most important requirements of the country's horticultural extension system, namely, the regularity of symposiums between extension officials, research, education and farmer associations, continuous review of research priorities, knowledge management planning, collecting, registering and valuing traditional knowledge. Determining the trust and support of government agencies and departments is also one of the most important and effective determinants for the activities of horticultural consulting service companies. Lashgarara and Hosseini (2008) reported from the perspective of extension experts that six socioeconomic factors are important in affecting the privatization of extension services in Iran. These were financial-structural, participatory constraints, information commercialization, technology transfer

mechanisms and individual characteristics. According to the findings of Aghasizadeh (2019), the optimal structure of extension services requires special impacts on new, creative structures in Iran. Some of the factors and requirements are underlying requirements, dynamism and fluidity, human development, integrated professional promotion and education.

In this context, Prager et al. (2017) highlight the significance of consulting institutions employing a diverse range of knowledge resources in a synchronized and collaborative fashion. These institutions must maintain a dedicated group of consultants who receive continuous training and remain actively engaged in projects. The effectiveness of counseling establishments is optimized through a balanced blend of adaptability and consistency. Within this framework, diverse approaches can be adopted by various groups to effectively cater to the needs of counseling. Davis and Terblanche (2016) examined the challenges of extension consulting services and found several factors that influence design and delivery in horticultural consulting services. These factors were policy environment, government performance (pluralism and partnership), capacities and competence, technical and functional factors and professionalization of the extension services. Birner et al. (2019) emphasized the importance of environmental policies, horticultural systems, economic conditions, social criteria and the capacity of service providers.

After reviewing various studies and summarizing the results, all cases were classified in the form of six factors to improve the sustainability and continuity of private sector extension services. They comprised the economic factor, educational extension, managerial, sociocultural, policy-making, and infrastructure (Zhu et al., 2000; Mandler, 2010; Ehsanifar et al., 2016; Rasouliazar et al., 2016; Raidimi and Kabiti, 2017; Haghighat et al., 2019; Katothya et al., 2020; Kilelu et al., 2020; Mwaura, 2020; Iskandar et al., 2021). The six factors were combined in the conceptual framework of this study (Fig. 1) and were examined in the course of the study. Accordingly, several research hypotheses were made: economic (H1), educational-extension (H2), management (H3), sociocultural (H4), infrastructural (H5), and policy (H6) factors affect the sustainability of horticultural private extension services (SHPES). The knowledge gap comprised questions on the extent of mutuality between the six factors and progress in horticultural consultation, whereby farmers could benefit efficiently from private extension services. The overall purpose of this study was to investigate the factors affecting the sustainability and continuity of horticultural private extension services from the perspective of public sector experts in Qazvin and Zanjan provinces.



Fig. 1. Conceptual framework of research

Methods and materials

Collecting survey information and performing data analysis for descriptive correlation were based on structural equation modeling. The study's statistical population included 241 public sector extension experts from Zanjan (131 people) and Qazvin (110 people). These experts had at least bachelor's degrees and several years of work experience in the field. The sample size was determined according to Cochran's formula and comprised 148 people. These people were selected using stratified random sampling with proportional assignment in the two provinces. Since differences existed in the cities of the two provinces regarding educational facilities and extension services, there were variations in the experts' mode of interaction with villagers. However, the two provinces are geographically adjacent and have similar cultural and exchange values, so the said variations were minimized within the groups. In this method, it is necessary to collect sub-group volume information. For this purpose, the required information was received from the relevant centers and, then, based on an appropriate formula (Azar and Momeni, 2016), the volume of each level was calculated in proportion to the volume of its community. In this method, the sampling fraction is specific to each class and to calculate the ratio of each class, the following formula:

$$n_{h=}N_K\left(\frac{n}{N}\right)$$

 n_h = proportional volume below community 1

 N_k = actual volume of subcommunities

n = sample size studied

N = total volume of the study population

The method involved listing names of experts in the public sector and separately assigning a number to the people of each class. Then, according to the sample size in each class, the people in each sample were selected randomly.

Table 1. Statistical	population and	sample size of experts
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Public sector experts				
Province	City	Number of experts	Sample size	
	Abeek	20	12	
	Alborz	10	6	
0	Avaj	5	3	
Qazvin	Boeen zahra	30	18	
	Takestan	18	11	
	Qazvin	27	17	
	Abhar	24	15	
	Ejrod	11	7	
	Khoramdare	8	5	
Zanjan	Zanjan	42	26	
	Mahneshan	9	5	
	Tarom	19	12	
	Khodabande	18	11	
Total		241	148	

The data collection tool was a researcher-made questionnaire designed based on the conceptual framework of the research. This questionnaire includes three main sections: demographic characteristics, factors affecting the sustainability of private extension services (98 questions), and sustainability of private extension services (10 questions). Questions were relevant to the factors affecting the sustainability of extension services. These included economic (7 questions), educational-extension (21 questions), managerial (22 questions), sociocultural (17 questions), policy-making (19 questions) and infrastructural factors (12). Face validity, content validity (Lawshe, 1975), convergent validity and differential validity of the instruments were examined and confirmed. Questions were evaluated based on the opinion of 40 experts to evaluate the content validity. According to the Lawshe test, the minimum acceptable CVR value for the 40 experts was 0.29. Therefore, questions with calculated CVR values of less than 0.29 were removed from the list of questions because they did not have an acceptable validity coefficient based on the content validity index. The reliability of the study instrument was also calculated using the combined reliability and Cronbach's alpha coefficient (Hair et al., 2012). Finally, the validity and reliability parameters were confirmed so that the factor loads were valued higher than 0.4 and the AVE values were higher than 0.5 (Hair et al., 2012). Combined reliability and Cronbach's alpha coefficients were also higher than 0.7.

Evaluating the effects of independent variables on dependent variables required partial least squares modeling with Smart PLS software. In this regard, the evaluation of the external model or measurement model ultimately measured the reliability and validity of the structures or the same research variables. Each variable occurred in the form of a designed model and the evaluation of the structural model, which led to the evaluation of statistical significance and research hypotheses.

Results

The status and prioritization of each factor affecting the sustainability and continuity of private extension services were evaluated from the perspective of public sector experts. The average deviation and coefficient of variation (CV) revealed four factors as central to sustainability: *i.e.*, educational, cultural, social and policy, which had the highest priority in promoting sustainability and continuity (Table 2).

Structural equation modeling was used to evaluate the factors affecting the sustainability and continuity of private extension services. In this regard, a model was developed by integrating all the structures in the conceptual framework of the research by Smart-PLS software. Then, we evaluated the measurement model, the structural model and relevant indicators. The data were evaluated and fitted before the research hypotheses were tested.

Confirmatory factor analysis was used for evaluating the measurement model in which convergent validity, discriminant validity and reliability were examined. After running the model, the results for convergent validity included combined reliability, AVE and item factor loads. These were reviewed and compared. As a result of confirmatory factor analysis of factors affecting the SHPES, all factor loads were greater than 0.4. Therefore, these indicators remained in the model and indicated that all items had a high level of correlation measure among the variables (Table 3 and Fig. 2).

Table 2. Prioritization of factors affecting the sustainability of extension services from the horticultural perspective of experts

Factors affecting the	Government experts					
SHPES	Number	Average	SD	CV	Rank	
Educational-extension services	148	4.19	0.415	9.9	1	
Sociocultural	148	4.08	0.473	11.59	2	
policy	148	4.07	0.493	12.11	3	
Managerial	148	4.16	0.525	12.63	4	
Infrastructure	148	3.99	0.569	14.26	5	
Economical	148	3.71	5.95	16.03	6	

(Scale: 1 = very inappropriate, 2 = inappropriate, 3 = moderate, 4 appropriate, and 5 = very appropriate)

Table 3. Factor loads of items related to factors affecting stability

Item	Economic factor	Educational- extension services	Management agent	Socio- cultural factor	Policy agent	nfrastructure agent
1	0.831	0.438	0.599	0.424	0.647	0.670
2	0.859	0.620	0.409	0.415	0.629	0.449
3	0.449	0.666	0.459	0.746	0.603	0.476
4	0.486	0.19	0.531	0.598	0.615	0.603
5	0.485	0.716	0.479	0.492	0.461	0.747
6	0.799	0.670	0.589	0.450	0.680	0.550
7	0.802	0.446	0.698	0.657	0.732	0.585
8		0.642	0.793	0.431	0.696	0.504
9		0.542	0.593	0.420	0.557	0.473
10		0.642	0.548	0.492	0.489	0.457
11		0.705	0.482	0.641	0.481	0.462
12		0.718	0.726	0.430	0.893	0.459
13		0.738	0.767	0.421	0.495	
14		0.841	0.543	0.801	0.531	
15		0.552	0.546	0.496	0.584	
16		0.819	0.405	0.682	0.784	
17		0.863	0.608	0.565	0.543	
18		0.789	0.574		0.559	
19		0.568	0.562		0.759	
20		0.763	0.671			
21		0.787	0.687			
22			0.634			

Also, according to the results, the model's structures and items showed acceptable parameter values. Where the mean value of extracted variance (AVE) was higher than 0.5, the values of combined reliability (CR) and Cronbach's alpha were higher than 0.7 (Table 4). Therefore, all structures have the necessary convergent validity and reliability.

The structural model was applied to investigate the relationships between structures and test the hypotheses. This was carried out via the bootstrapping technique and was evaluated by comparing the values of coefficients of determination (R2), path coefficients (b) and values of t (Table 5). In general, the structures relevant to the sustainability of private extension explained about 78% of the variance of the SHPES from the perspective of public sector experts. Parallel to this, three criteria were considered in confirmation of the suitability of the structural model at a strong level. Regarding the direct effects of the research structures, the paths' significance and the structural model's appropriateness were determined. Meanwhile, all numbers on the paths were greater than 1.96 for the purpose of this determination. The significance and confirmation of research hypotheses occurred for

Table 4. Model parameters for measuring the factors affecting the SHPES

Structures	Cronbach's alpha	CR	AVE
Economical	0.811	0.794	0.543
Educational	0.920	0.931	0.541
Managerial	0.887	0.903	0.532
Sociocultural	0.785	0.790	0.525
Policy	0.882	0.898	0.534
Infrastructure	0.765	0.787	0.526

each of the six factors. The first of these factors was the economic factor for which the value of t equaled 13.129 and was greater than 1.96. In contrast, the intensity of the relationship between the two variables was 0.463, so this value can be considered as the impact of the economic factor on the stability and continuity of private extension services. Ultimately, this factor was ranked third in terms of effectiveness. The second factor was the educational-extension. The t value in this factor equaled 14.135 and was greater than 1.96, while the intensity of the relationship between the two variables was 0.463, meaning that this factor had an impact of 0.463 and ranked second in terms of effectiveness. The third factor was the management factor, the t value of 14.465 and greater than 1.96. The intensity of the relationship between the two variables was 0.404, so it had an impact of 0.404 on the SHPES and ranked sixth in terms of effectiveness. The fourth factor was sociocultural values. The t value equaled 13.303 and was greater than 1.96, while the intensity of the relationship between the two variables was 0.428 and so was the impact of this factor on the SHPES. The sociocultural factor ranked fourth in terms of effectiveness. The fifth factor was policy. The t value in this factor equaled 12.506 and was greater than 1.96, while the intensity of the relationship between the two variables was 0.408, so it can be concluded that the policy factor regarding the SHPES has an impact of 0.408 and ranked fifth in terms of effectiveness. The sixth factor was infrastructure for which the t value was 15.518 and was greater than 1.96. The intensity of the relationship between the two variables was 0.474, so the infrastructure factor had an impact of 0.474 on SHPES and ranked first in terms of effectiveness.

The Good Fit Index (GOF) model of the factors shows the compatibility between the structural and measured models' quality. While the acceptable value for this criterion should be higher than 0.36 (substantial), the calculated GOF value here was 0.507, so it can be said that the model's fitting was appropriate and significant. In simpler terms, the data of this research have a suitable and strong fit with the factorial structure and the study's theoretical basis (Table 6).

Table 6. GOF results of the model's fitting factors affecting the SHPES.

Structures	AVE	\mathbb{R}^2	
Economic factor	0/543	0/407	
Educational factor	0/541	0/640	
Management agent	0/532	0/782	
Socio-cultural factor	0/525	0/745	
Policy agent	0/534	0/549	
Infrastructure agent	0/526	0/527	

$$\sqrt{AVE} = 0/729$$

$$\sqrt{R^2} = 0/695$$

 $GOF = \sqrt{AVE} \times \sqrt{R^2} = 0/507$

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Fig. 2. Model for measuring the factors affecting the SHPES based on confirmatory factor analysis

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	Hypothesis	Path coefficient (β)	t-value	p-value	Result
H1	Economic factor \rightarrow SHPES	0.463	13.129***	0.0001	Confirmation
H2	Educational-extension services factor \rightarrow SHPES	0.463	14.135***	0.0001	Confirmation
H3	Managerial factor \rightarrow SHPES	0.404	14.465***	0.0001	Confirmation
H4	Socio-cultural factor \rightarrow SHPES	0.428	13.303***	0.0001	Confirmation
Н5	Policy Factor \rightarrow SHPES	0.408	12.506*	0.0001	Confirmation
H6	Infrastructure Factor \rightarrow SHPES	0.474	15.5***13	0.0001	Confirmation

Table 5. Test of hypotheses, estimation of t values for all path coefficients of the structural model

Discussion

Regarding the direct effects of all research structures on the sustainability and continuity of private extension services, one of the most apt approaches was to relay the perspective of public sector experts on the subject and its surrounding issues. Accordingly, the infrastructure factor positively and significantly affected the SHPES, consistent with previous reports (Mandler, 2010; Rasouliazar et al., 2016). In infrastructure, several subdivisions of factors influence the decision-making process and implementation in general. These subdivisions of the infrastructure factor are crop diversity index, horticultural land dispersion index and index of attention to the type of horticultural system, i.e. livelihood, commercial (Davis and Terblanché, 2016; Rasouliazar et al., 2016; Razzaqi Borkhani and Asadi, 2017; Iranpour et al., 2019). In other words, from an expert point of view, corporate activities are more likely to be sustainable if the extension services of private companies include more horticultural products instead of focusing on specific products and if more emphasis is given to requirements that facilitate commercial agriculture for small farmers.

Based on the results of the educational extension services, as a factor, a positive and significant effect was observed by this factor on the SHPES. In the educational-extension factor, several subdivisions of this factor can be influential on the SHPES, including the index of providing timely information about the market situation and price of products, the index of methods of access to the audience and the client (Barrett et al., 2005), and the index of providing technical knowledge to farmers to improve the quantity and quality of products. Since private sector experts work in the countryside and have a close relationship with the beneficiaries and operators, one of the most sought educational needs usually focuses on the flow of information about horticultural products with better yield, marketability and post-harvest durability. In this regard, it is very important to focus on accessing the farmers and individuals involved in the market chain. Contact methods can be personal, i.e. through the farm head or office, or via other devices such as phone calls, WhatsApp, Instagram, etc. The provision of technical solutions to farmers should first focus on the compatibility of technical advice with the prevailing conditions of farmers, their educational level and their ecological-economic demeanor. The beneficiaries of these services are more welcome, sustainable and help keep consulting firms afloat.

The economic factor had positive, significant effects on the SHPES, confirming the previous study (Rasouliazar *et al.*, 2016). In the economic factor, several influential items on the SHPES were the yield level index of products and farmers' income index (Razzaqi Borkhani and Asadi, 2017). In other words, the higher

the income of farmers-which corresponds with their crop yield - the more they are likely to accept private consulting services. Accordingly, increasing the farmers' acceptance of consulting services can ultimately make the activities of consulting companies sustainable.

The sociocultural, policy, and managerial factors positively and significantly affected the SHPES. Regarding the sociocultural aspect, the indicators of executive performance in companies create trust in officials and stakeholders to transfer activities to the private sector and how to deal with villagers and farmers (Zarafshani *et al.*, 2012; Badsar *et al.*, 2015). Regarding the policy factor, the index of design codifies coherent policies to support consulting service companies. The index of design is an indicator of the existence of an appropriate information management system to share and facilitate the flow of information in consulting service companies. The job security index of members of consulting service companies is also influential in this regard (Mandler, 2010; Shuiklo *et al.*, 2018).

Regarding the managerial factor, the influence on sustainable consulting services relies on individual members, their satisfaction, CEO satisfaction index and overall activity in the company (Mandler, 2010; Rezaee *et al.*, 2015). The members' cohesion index, the index of trust between members and the CEO can be considered as influential items on the sustainability and continuity of private extension services. This means that, from the experts' point of view, when the members have a sense of satisfaction and trust in each other and the CEO, it will cause stability in the company and sustain its activity. Also, experts believe that if the members of a company have a spirit of teamwork and avoid monotony, cohesion will increase among the group members and, thus, sustainability is more likely to remain for the activities in the company.

The findings indicated that the infrastructural, educationalextension and economic factors positively impacted the structure of sustainability and continuity of extension services and activities in the private sector. Due to the importance of the infrastructure factor, organizing the private extension network should involve supportive policies to set up start-up consulting companies. These can promote the society's acceptance of horticultural private extension services in the region. Briefings can be organized for farmers to familiarize them with the goals and functions of consulting services companies, while corporate revenue can be increased by transferable responsibilities and the flexibility of players and their roles.

Considering the significance of the educational-extension factor, holding in-service and out-service training for the experts of consulting service companies can inform the technical and specialized fields of agriculture, marketing of horticultural products, entrepreneurial skills, communication skills, rural sociology, cooperative laws, *etc*.

The economic factor calls for establishing a Trust that could rally memberships around common goals that necessitate similar financial demands, whereby the route to achieving targets among consulting services would be outlined clearly, categorically and stepwise. Governmental organizations should provide working capital for relevant consulting activities. Necessary measures ought to be taken to legalize the granting of financial aid and facilities by banking and economic institutions to consulting service companies.

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