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Assessing the Stability of Farming System in Rural Production Cooperatives in Isfahan Province and the Effective Strategies to Achieve it

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Abstract
Purpose- Rural production cooperatives (RPCs) play an important role in sustainable development in rural areas by considering three principles: domination, possession, and agency in the agriculture sector. The purposes of this study are to measure the stability of RPCs and presenting effective strategies to achieve it from the managers' view point.
Design/methodology/approach- The present study is a mixed-research method using analytic-descriptive method, including two different questionnaires. One questionnaire aiming at prioritizing and measuring the stability of the RPCs was prepared and presented to the members of RPCs. Stability was measured with 24 indices in three economic, social, and environmental dimensions using Shannon Entropy technique, according which the cooperatives were prioritized. The other questionnaire was prepared to present the best approach to achieve sustainable development from the view point of the managing directors and the board of directors. The best strategy was adopted using SWOT and ANP analysis.
Findings- Regarding the sustainable development, the findings of the study indicated that among rural production cooperatives in Isfahan, 12 cooperatives were unstable, 8 cooperatives were semi-stable, and 8 cooperatives were stable; this type of farming system is semi-stable. Developmental strategy (SO) was adopted as the best strategy to achieve sustainability, and the focus was on endogenous development through reinforcing internal strengths to obtain external opportunities. It includes promoting self-reliance through increasing members' participation in cooperative, empowering the staff and members (i.e. the experienced managing director and the staff with required specialty and expert holding promotional classes), using multilevel, multi-sectorial, multi-cluster, collaborative, and holistic approaches to manage the RPCs, and promoting systems based on collaborative team work.
Practical Implications- In rural sustainable development planning, sustainable farming systems must be considered as the focal core of any development plan. Since a big part of farming system in rural areas is devoted to smallholdings, promoting cooperation culture by the rural development planners can prepare the ground for empowering the villagers to obtain sustainable development .
Originally/value: For the first time in Iran, the current research attempted to present functional strategies for RPCs development using a mixed-method design.
Keywords- Sustainable development, rural production cooperative, measuring sustainability, exploitation system.
Paper type- Scientific & Research.

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1. Introduction

The basic requirement of using sustainable resources is to observe the capacity of natural resources. Measuring and analyzing stability is in fact the determination of this capacity. Analyzing stability is a reasonable basis and criterion for determining environmental standards which control the way of exploiting the resources. Analyzing stability determines the criteria and the amount of distance between the primary and stable condition and the current state of an environmental phenomenon. In analyzing stability resources' capacity and economic sustainability as to the relation with the production requirement of concern must be controlled and analyzed at the same time. Measuring stability is complicated and includes complicated interactions among technology, environment, and society (Amini Faskhoudi & Nouri, 2011). Because of stability in agriculture is a function of internal and external ecologic, economic and social factors, its changes in agricultural structures will be effective. The growing procedure of land distribution to small parts as a result of inheritance law, decreased efficiency of lands, human force, and investment in agriculture sector which are the negative consequences of land reform, thus the strategy of establishing RPCs is on the state agenda. The main task of RPCs was to prevent the villagers from immigrating to the cities and creating a balance between the development of rural and city areas. They introduced an efficient tool for rural development following the comprehensive development plans in the country. Despite the above issues, since RPCs and commercial and industrial corporations have been introduced as the best type of farming system, but because of the lack of defined strategy in development, they are not at a good level regarding rural and agricultural sector. Presently, the issue of stability of farming systems is one of the main and most important issues in farming system in the structural aspect; and hardware arrangements without defining the structural and software changes, frames will not have a favorable result. Farming systems are social organizations including several interweaved components allowing for producing farming products by a unit management and identity. Presently, there are 1369 RPCs with 402177 members and 3191507 hectares of member land (Central organization of rural cooperative, 2015).

Isfahan Province has 444474 hectares of farming land and 174120 farmers whose average farm land size is about 2.4 hectares. Almost the 89% of farming lands belongs to the smallholding farming system which their land size is below 5 hectares, and the 58.6% of lands are below 1 hectare. This has led to the management of farming organizations to become weak and consequently investment in infrastructures will not be economic and the efficiency of rare sources like water, soil, machinery and natural sources will be low. It is a big barrier to rural sustainable development especially under the conditions of crisis in general management. Therefore, the need for achieving a sustainable farming system has been considered by government as one of the strategic goals of rural development. Hence, this province has been leading in organizing and forming RPCs. Presently, there are 28 active RPCs in 13 towns in this province founded in two decades. The 13% of the farmers are the members of the cooperatives, including the 8% of the lands all over the country and the 28% of the lands in the province (Ministry of Jahad Keshavarzi, 2012). The main goal of the present study is thus to measure sustainability in the RPCs farming system in Isfahan Province and analyze the factors affecting the achievement of these cooperatives with regard to the sustainable development.

2. Research Theoretical Literature

The society is sustainable only if both human and ecosystem conditions are satisfactory or in the process of being improved. According to this definition, a system is sustainable when farmers and system members use the environment in a way that utilizes the proper capacity to cause less harm to the environment. One of the most important components of every utilization system is the method of production, which is considered as sustainable agriculture. This concept consists of managing the utilization of agricultural ecosystems through which biodiversity, productivity, and reproductive capacity are preserved. Under these conditions, ecosystems can, currently and in the future, carry out their social, economic, and environmental functions at the local, regional, and national level and do not cause harm to other ecosystems. Hence, any

farming system includes economic, social, and environmental dimensions (Sadatipour, 2009).
Economic sustainability emphasizes maintaining or improving economic conditions. This concept suggests the production stability, increased productivity, diversification, sustainable employment, and the adequate income of villagers. The social sustainability of farming system expresses the independence, equality, and improvement of the living conditions of farmers in each system of utilization. When a system of utilization is accepted in the interaction with the social environment, it can be considered sustainable. Achieving this goal involves "the development of equality, increasing human capital (literacy, occupational skills and health), social capital, expanding partnerships, helping with poverty alleviation, empowering and improving the quality of life" (Asadi & Mahdiei, 2009). One of the important elements of social sustainability is the amount of social capital among its members. According to Pantam (2001), this view suggests that the features and elements of the social system (trust between individuals, social norms, mutual interaction, and social networks) make coordination between individuals of a community for achieving mutual benefit possible. He divides social capital into two forms of capital: in-group and out-group. In-group capital, he believes, refers to the intra-group cohesion and the elimination of strangers, whereas out-group social capital refers to the relationship of different groups with each other (Ahmadi Firoozjani et al., 2007).The most important sustainability aspect based on the goals of the Brant-Land Commission is environmental. This is because the sustainable development paradigm was formed in support of the environment. Sadatipour (2009) believes this concept suggests the adaptation and/or the ecological health of the system, which involves maintaining or not destroying the ecosystem's vital forces. The results of research have shown that reducing the use of fertilizers, performing crop rotation, using organic fertilizers and herbal remnants in soil fertilization, and the low use of chemical fertilizer are all essential for the environmental sustainability of farming systems. In this case, researchers have also attempted to introduce effective models to measure sustainability (Zhen & Routray, 2003). Lack of a comprehensive definition of sustainable agriculture (Gafsi et al., 2006), natural, technical and social conditions (Von Wiren & Lehr, 2001), and also the introduction of a comprehensive and precise methodology has made it difficult to measure this concept. In general, there is no comprehensive method for measuring the stability of all systems, but the technique that is common to all methods is the use of sustainability indices. Hence, an overall assessment of sustainability should take its environmental, economic and social dimensions into account (Becker, 1997; Van Calker, Berentsen, Giesen & Huirne, 2006). Sustainability measurement involves identifying important attitudes and finding a single standard for welfare that can guide them into a hybrid sustainability scale. Many researchers have simultaneously taken advantage of economic, social and environmental indicators for measuring farming systems stability (see for example, Zhen & Routray, 2003; Van Calker, et al., 2006; Sydrovych & Wossink, 2008; Castodeli & Bechini, 2010; Binder, Feola & Steinberger., 2010).
Conducted studies on accessing RPCs or agricultural cooperatives to sustainable development are described below:
Prneetvatakul, Janekarnkij, Potchansin & Prayoonwong (2011) stated the effects of social participation of members on economic participation, government financial assistance, as well as the advice and oversight of beneficiary government organizations. Briscoe (2010) assessed the role of trainings for members and the dynamic leadership by the board of directors. Alexander (2009) states that collectivism spirit, level of education and relevance of education with RPCs activity, management history, and collaborative membership are of essence. John (2008) insist on the degree of cooperation between organizations and institutions, revision with cooperative companies, strengthening effective functional coherence between members and RPCs, also Krishnaraji (2005) insist on enhancing members' participation in education, and enhancing members' participation in RPCs affairs, Lawson (2000) refers to the technical information of members and staff, existence of an efficient organizational structure, outlined as the effective factors on the achievement of companies for sustainability.

3. Research Methodology

3.1 Geographical Scope of the Research

The geographic area of this research is Isfahan Province, and the statistical population includes 28 active rural cooperative enterprises whose geographical locations are shown in Figure 1.

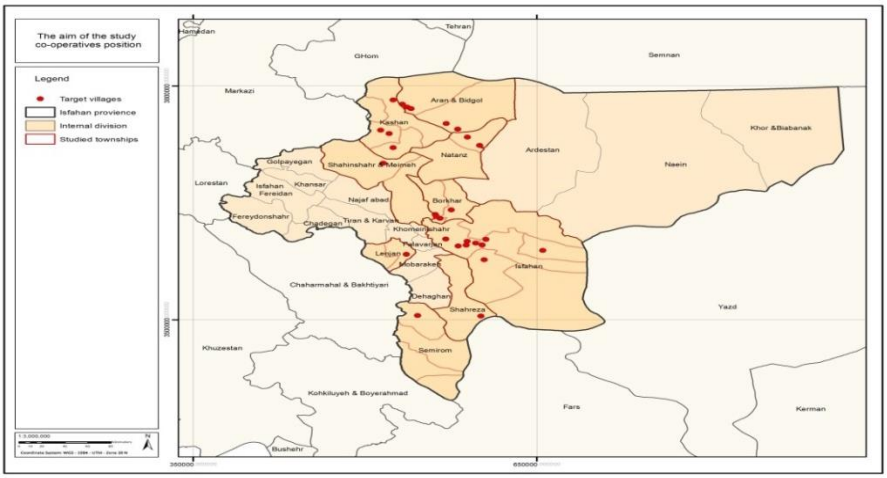

Figure1.Location of RPCs in Isfahan Province
(Source: Research Finding, 2017)

The required data is collected at the level of all RPCs, managers (N=28), and all the board of directors (N=140) for the combined analysis. To collect the stability of the cooperatives, there was no information from the 17362 utilities of the cooperatives of rural production due to the wide range of statistical population. The sample size was calculated using the Cochran Formula and the appropriate assignment method of sample size from each company. Then, a random sampling method was used to select the users.

Table 1. Number of selected samples from farming units
(Source: Research Finding, 2017)

Name of Townships	Number of RPCs	Number of farmers	Number of samples	Name of Townships	Number of RPCs	Number of farmers	Number of samples
Aran and Bidgol	2	1458	30	Shahreza	1	300	6
Isfahan	6	5998	123	Kashan	3	1971	40
Borkhar	4	1215	25	Golpayegan	1	242	6
Semirum	2	1756	36	Lenjan	2	1880	39
Shahinshahr	3	1611	33	Mobarakeh	2	576	12
Natanz	2	355	7	Total	28	17362	357

3.2. Methodology

This research is a quantitative and qualitative research. In terms of its purpose, it is an applied research; it is also a descriptive (non-experimental) according to the method of data collection (research design), which conducted in a cross-sectional manner. The data needed for this study were collected by documentary and field survey (questionnaire and interview). Two types of documentary and field studies were used to collect the data. Data analysis was done in descriptive and inferential sections. Descriptive statistics were used for categorizing the subjects in terms of different traits and describing the statistical population. In order to assess the stability of economic, social and environmental factors affecting the sustainability of farming system, a general index of sustainability was made. In this research, Shannon Entropy method was used to analyze the collected data. Entropy in information theory is a measure of uncertainty expressed by probability distribution. To use the entropy method, the following steps are

implemented (Azar & Rajabzadeh, 2012). The steps of this method include four steps as follows:
First in order to study sustainability of RPCs farming system, the economic, social and environmental indices were examined. The method of Shannon entropy was used in this study to analyze the gathered data. In information theory, entropy is a measure of uncertainty expressed by the probability distribution. D decision matrix with m and n option index (or measure) is as follows:

$$(1)\ D = \begin{array}{c} \\ A_1 \\ \\ \\ A_2 \end{array} \begin{array}{c} \begin{array}{cccc} X_1 & X_2 & & X_n \end{array} \\ \begin{bmatrix} r_{11} & r_{12} & \dots & r_{1n} \\ r_{21} & r_{22} & \dots & r_{2n} \\ & & \vdots & \\ r_{m1} & r_{m2} & \dots & r_{mn} \end{bmatrix} \end{array}$$

The following steps are taken to use the entropy. The entropy method consists of 4 steps as follows:
Step one: Calculating the entropy of a probability distribution:
The value P_{ij} for the index j in the above matrix is calculated as follows:

$$(2)\ P_{ij} = \frac{r_{ij}}{\sum_{i=1}^{m} r_{ij}} \quad , j = 1,2,\dots,n \quad ,\forall_{ij}$$

Step two: Calculating the entropy value:
The value of entropy (E_j) is calculated as follows:

$$(3)\ E_j = -K \sum_{i=1}^{m} P_{ij} * \ln P_{ij} \quad ,\forall_j$$

K is a constant which preserves the value E_j between zero and one and is obtained from the following equation:

$$(4)\ \mathrm{K} = \frac{1}{\ln(\mathrm{m})}$$

Step three: Calculating the degree of deviation:
The degree of deviation (d_j) is determined as follows:

$$(5)\ d_j = 1 - E_j \quad ,\forall_j$$

It should be noted that the degree of deviation indicates how much useful data the corresponding index (j) provides for of decision-maker in order to make a decision. The more the calculated values of the indices are close together, the more they indicate that the opponent choices are not much different in terms of this index, and the role of the index is reduced in decision-making accordingly.
Step four: Calculating the importance of the weight of criteria:
Finally, the importance of the weight of criteria is calculated as follows:

$$(5)\ W_j = \frac{d_j}{\sum_{j=1}^{n} d_j} \quad ,\forall_j$$

According to Prescott-Allen sustainability classification, the sustainability of the common characteristics for studied farming systems is defined as unsustainable, semi-sustainable, and sustainable or acceptable at 0-0.4, 0.4-0.6, 0.6-1, respectively (Roknodineeftekhri & Agayarihir, 2006).
The weight of each of the indices was calculated by the entropy method. The economic, social, and environmental dimensions were prioritized and ranked by the method of Shannon entropy; it was determined by the weight of each of these indices from the perspective of RPCs in Isfahan Province.
In the second part of the combination method, qualitative content analysis and strategic SWOT technology were used to formulate an effective strategy for the access of RPCs to sustainability. In this part of research along with other qualitative research, first the appropriate methods such as in-depth interviews, group discussion, and in fact a combination of these items with a general question followed by a partial question for data collection requirements in qualitative research were used. Then, in the quantitative part of research, network analysis (ANP) was adopted to analyze and rank the four strategies of SO, ST, WO and WT. Data analysis also started with the collection of data in qualitative research at the same time. During the process of data analysis, the units of analysis were identified first. In the present study, the entire text of each interview was considered as the unit of analysis. Subsequently, the semantic units identified that the terms and sentences contained different aspects of the concept. Then, coding was done in two open and axial ways in which semantic units were compressed and converted into code. At an open coding level, the line was retrieved into data lines and each of the concepts was extracted in one of the SWOT analysis factors (strengths, weaknesses, opportunities, and threats). Then, using pivot coding, the primary codes derived from open coding were reduced to class. At this stage, the encoded data was compared and presented as clusters or categories fitting together. Then each level was compared with other classes to ensure that the classes were distinct from one another. In the next step, SWOT matrix was formed using cross-cluster of four factors,

strengths, weaknesses, opportunities and threats. These strategies (SO, ST, WO and WT) were determined from four factors of SWOT analysis (Wheelen & Hunger 2012).

4. Research Findings

4.1. Sustainability assessment of RPCs farming system:

In this section, key and effective indicators of the sustainability status of RPCs were studied, including the 24 indicators of three groups, namely economic, social, and environmental factors. First, the indicators are made scale free and become standardized through fuzzy method, and by considering the standardized and numerical values of the stability indicators, their stability status is assessed in the RPCs farming system. The results are shown in Table 2.

Table 2. Stability status of indicators in RPCs by Std. mean
(Source: Research Finding, 2017)

Sustainability Dimension	Index	Mean	Std Mean	Status of sustainability
Economic	Average of yield per area(ton/hec)	12.47	0.405	Semi-stable
	Percentage of insured lands to total land	27.5	0.403	Semi-stable
	Rate of governmental credit use (R/hec)	111244300	0.698	stable
	Farm income(R/hec)	7054828	0.401	Semi-stable
	Average of farm costs	3097909	0.402	Semi-stable
Social	Agricultural population density(person/hec)	38.571	0.569	Semi-stable
	Availability level of social facilities	3	0.399	unstable
	Exploiters' job satisfaction level	2.428	0.501	Semi-stable
	Participation in agricultural and rural activities	2.625	0.403	Semi-stable
	Membership in local communities	2.571	0.496	Semi-stable
	Accessibility to informative channels and resources	3.892	0.399	unstable
	Technical knowledge level	3.857	0.726	stable
Environmental	Conservative tillage	40.416	0.794	stable
	Land areas under crop rotation	41.521	0.652	stable
	Level land area	28.89473	0.802	stable
	Land area under new method of irrigation(hec)	21.59090	0.915	stable
	Land area under cultivated modified crop varieties	45.037	0.601	stable
	Non-arable land area in last 5 years*	0.95	0.398	unstable
	Burning wheat residuals (stubble & straw)*	0.92	0.399	unstable
	Using wheat residuals to graze livestock	33.636	0.399	unstable
	Consumption level of nitrate fertilizers*	0.223	0.405	Semi-stable
	Consumption level of phosphate fertilizers*	0.208	0.588	Semi-stable
	Consumption level of herbicides	0.117	0.398	unstable
	Consumption level of green manner	4568.4	0.497	Semi-stable

4.2. Reverse Index

As shown in Table 2, in term of standard deviation, Land area under new method of irrigation is the most stable index, while non-arable land area in last 5 years is the most unstable index in RPCs farming system. Six indicators are stable, 11 indicators are semi-stable and five other indicators are unstable. All in all, this farming system is stable in 29 percent of indicators, 46 percent semi-stable, and 25 percent unstable**.** Social dimension indicators based on the Likert scale were ranked in five levels (from very high, high, medium, low, and none, from one to five). The amount of combined index for RPCs is calculated and the results are presented in Table 3.

Table 3. Calculation of the sustainability of RPCs
(Source: Research Finding, 2017)

Index	Mean	Standard Deviation	Min.	Max.	Sustainability Status
Combined Index	0.504	0.297	0.105	1.349	Semi-stable
Standardized combined Index	0.420	0.238	0	1	Semi-stable

The mean and the standard deviation for the sustainability of RPCs are 0.504 and 0.297, respectively. These results indicates that this type of farming system is Semi-sustainable based on Prescott-Allen's sustainability level ranking. Also, this farming system is Semi-sustainable according to the standardized combined index. In addition, the rate of sustainability for each of sustainability dimensions of RPCs farming system is calculated as shown in Table 4

.

Table 4. Calculation of the sustainability of RPCs in three dimensions
(Source: Research Finding, 2017)

Dimensions	Mean	Standard Mean	Sustainability Status
Economic	2428423.8	0.481	Semi-stable
Social	8.135	0.559	Semi-stable
Environmental	398.312	0.392	unstable

As shown in Table 4, based on the average of the indices after eliminating the difference in scale, the RPCs farming system, the economic index is become unstable, the social index is become semi-stable and the environment is in unstable situation. As shown in Table 5, 12 RPCs are unstable, 8 RPCs are semi stable, and the rest of them are stable.

Table 5. Ranking RPCs farming system from stability status
(Source: Research Finding, 2017)

Name of RPCs	RPCs		Rank of RPCs	Name of RPCs	RPCs		Rank of RPCs
	Composit index	Sus.Status			Composit index	Sus.Status	
Argerodasht	1.35	stable	1	Dehkaram	0.46	Semi-stable	15
Kavir	1.06	stable	2	Zarinkesht	0.41	Semi-stable	16
Zarkesht	0.90	stable	3	Etehadfami	0.39	unstable	17
Galeagosheh	0.89	stable	4	Kosheh	0.37	unstable	18
Khazrakesht	0.77	stable	5	Kabirkamo	0.34	unstable	19
Zayandehroud	0.78	stable	6	Meshkat	0.32	unstable	20
Esfahanak	0.65	stable	7	Sonboleh	0.30	unstable	21
Sepahan	0.61	stable	8	Kohandasht	0.28	unstable	22
Amirkabir	0.57	Semi-stable	9	Golestanecedeh	0.22	unstable	23
Emamali	0.56	Semi-stable	10	Hossienabad	0.21	unstable	24
Algadir	0.54	Semi-stable	11	Emamjavad	0.19	unstable	25
Keshtkaran	0.54	Semi-stable	12	Barzok	0.16	unstable	26
Bersian	0.52	Semi-stable	13	Tangechaedeh	0.13	unstable	27
Hormozabad	o.48	Semi-stable	14	Golestan	0.10	unstable	28

4.3. Strategic analysis of factors influencing the success of rural production cooperatives in achieving stability

The results in Table 6 showed a qualitative content analysis, and the open and axial coding of the questionnaires and interviews run with executives indicate the factors as strengths, weaknesses, opportunity and threat

Table6. The Matrix SWOT Sub-factors
(Source: Research Finding, 2017)

Strengths	Weaknesses
S1. Economic participation	W1. Lack of awareness and knowledge about (RPC)s
S2. Member empowerment	W2. Insufficient appropriate infrastructure
S3. Using agricultural new methods	W3. Low level of board member education
S4. Member social participation	W4. Lack of expertise in the field of agriculture
S5. Existence of an educated and experienced managers	W5. (RPC)s´ dependence on state grants

Table 6.

Opportunities	**Threats**
O1. State grants to (RPC)s O2. Supervision of state organizations O3. monitoring and technical advice represented by Ministry of Agriculture O4. Low existence of directions to regulate and support the activities	T1. High interest bank rate T2. Reduction of state aid to (RPC)s T3. Weakness of the union of (RPC)s for supporting them T4. Establishing rival societies at the rural level

In order to have a better coordination, the codified data were compared with each other in each category of SWOT factors, by integrating similar items; the classical encoding was devised with new concepts during coding. Totally, according to the findings of this research, with respect to many indicators, including five factors as strengths, four factors as weaknesses, five factors as opportunities, and four factors as threats. These indicators were based on the viewpoint of senior executives (board of directors and director managers) of 28 RPCs are the members of these RPCs. Senior executives are elected by members in a general assembly. For the purpose of encouraging the participation of farmers, applying the intersection of the internal factors including the strengths and weaknesses and the external factors including the opportunities and threats, this SWOT matrix was devised. The SWOT and network analysis models have been integrated to enhance the efficiency of the strategic planning process and to innovate the research methodology. Accordingly, the steps of the merger in the strategic planning process are described below

1) The required information was collected through questionnaires and interviews. Questionnaires applied for identifying strengths and weaknesses as a result of internal analysis and opportunities and threats as a result of external analysis and ranking the importance of sub -factors, would allow organizations to introduce strategies that rely on strengths to reduce the perceived weaknesses, apply identified opportunities and devise a plan to reduce or eliminate the impact of the external threats. In this method, the ranking of all SWOT factors in the form of a Paired Comparison Questionnaire by applying the nine Scale of Thomas Saaty, by 10 experts in Rural Cooperative Organization, RPCs were Ranked and prioritized.

2) The importance of each SWOT factors is determined by calculating the weight matrix w1, while considering the situation where there is no internal independence among the SWOT factors. All of these factors are obtained via questionnaires and compared pairwise (Table 7) with respect to the geometric mean. The numbers in Table 7 indicate the relative importance of the SWOT factors obtained from pair-wise comparison in the questionnaire. The relative importance was calculated according to the nine quantity chart purpose suggested by Thomas Saaty (Ahmadi, 2007).

Table 7. SWOT pairwise comparison matrix

(Source: Research Finding, 2017)

SWOT Factors	**S**	**W**	**O**	**T**	W_1
S	1.0000	3.8817	0.8958	1.7095	0.3536
W	0.2576	1.0000	0.4308	1.0781	0.1346
O	1.1164	2.3212	1.0000	2.5520	0.3583
T	0.5850	0.9275	0.3918	1.0000	0.1534

The consistency ratio (IR) is determined using an equation. If it is less than 0.10, the result is accurate and there is no need for adjustments in the comparison or recalculation of the weights. If the IR is greater than 0.10, the results should be re-analyzed, and the reasons for the inconsistencies should be determined and then removed via partial repetition of the pairwise comparison (Azar & Rajabzadeh, 2012).

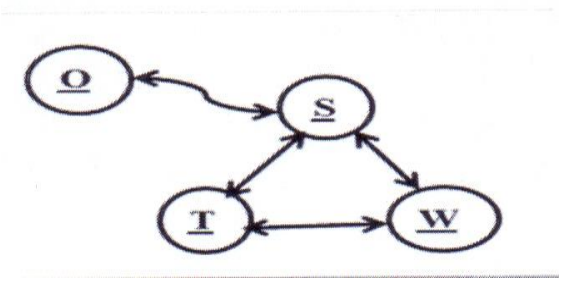

Figure 2. Internal interdependence of SWOT factors
(Source: Azar & Rajabzadeh, 2012)

3) The calculation of the W2: At this stage, we need to determine the weight of sub-factors by specifying the relationships between the SWOT factors. Inner dependence matrix of SWOT factors, through a scheme of internal interdependence is shown in Figure 2. Interdependencies between the main factors are determined by examining the effect of each factor on another one using the pairwise matrices. The interdependence between the main SWOT factors after analyzing the RPCs' internal and external environment is shown in Figure 2.
By placing the vectors of each table (W_{2j}), the matrix W_2 is formed. This matrix indicates the relative importance of the SWOT factors in situations where there is interdependence between them. This matrix is shown in Table 8.

Table8. pairwise comparison matrix is interdependent matrix of SWOT factors
(Source: Research Finding, 2017)

Strengths	S	W	O	T
S	1.0000	0.3011	0.4725	0
W	0.2907	1.0000	0.5275	0
O	0.4213	0.6989	1.0000	0
T	0.2880	0	0	1.0000

4) Determining the priority of SWOT factors by considering their dependence: At this stage, using two matrices W1 (relative importance of the factors obtained in the second stage) and W2 (relative importance obtained from the third stage) and multiplying these two matrices in each of them has internal preferences of SWOT factors.
5) Determining the degree of relative importance of sub factors of SWOT: At this stage, the relative importance of SWOT sub-factors is obtained using the combination of matrix comparison of experts. These matrices are used for the following factors: strengths, weaknesses, opportunities, and threats.
6) Determination degree of importance of sub factors of SWOT: At this stage, the total weights of the sub factors are obtained through weight multiplication, the main factors ($W_{normalize}$) in the relative weights of the sub-factors ($W_{Sub\ Factors}$). The results are presented in Table 9.

Table9. Final Priority of each SWOT sub factors
(Source: Research Finding, 2017)

SWOT Factors	Weight of Factors	Sub factor of SWOT	Weight of Sub Factors	Total priority of sub factors
Strengthens	0.3051	S1	0.092	0.0283
		S2	0.146	0.0448
		S3	0.124	0.0380
		S4	0.202	0.0618
		S5	0.131	0.0401

Table 9.

SWOT Factors	Weight of Factors	Sub factor of SWOT	Weight of Sub Factors	Total priority of sub factors
Weaknesses	0.2309	W1	0.1686	0.0389
		W2	0.1118	0.0358
		W3	0.1282	0.0296
		W4	0.1435	0.0331
		W5	0.1227	0.0283
Opportunities	0.3257	O1	0.2177	0.0710
		O2	0.1933	0.0630
		O3	0.1738	0.0566
		O4	0.2091	0.0681
Threats	0.1382	T1	0.1952	0.0270
		T2	0.2168	0.0300
		T3	0.1740	0.0241
		T4	0.1737	0.0240

After the priority of the following SWOT factors was determined, the following factors accounting for the highest priority in the formulation of strategies were used. The weights of the sub-factors multiplied by the weights of the factors were considered as the total priority of the sub-factors. The sub-factors are introduced in Table 6 and ranked according to their total priority in Table 10.

Table10. Ranking of SWOT sub- factors

(Source: Research Finding, 2017)

SWOT Factors	SWOT Sub- factors	Rank
Strengthen	S4. member social participation	1
	S2. Member empowerment	2
	S5. Existence of an educated and experienced managers	3
	S3. Using agricultural new methods	4
	S1. Economic participation	5
Weaknesses	W1. Lack of awareness and knowledge about (RPC)s	1
	W2. Lack of expertise in the field of agriculture	2
	W4 Insufficient appropriate infrastructure	3
	W3. Low level of education for board of directors	4
	W5. Dependence of RPCs on state grants	5
Opportunities	O1. State grants for RPCs	1
	O4. Low directions to regulate and support activities	2
	O2. Supervision by state organizations	3
	O3. Monitoring and technical advice from the Ministry of Agriculture	4
Threats	T2. Reduction of state aid to (RPC)s	1
	T1. High interest bank rate	2
	T3. Weakness of the union of (RPC)s for supporting RPCs	3
	T4. Establishing rival societies at the rural level	4

After identifying the priority of each of the SWOT sub-factors, it can be used in the formulation of strategies through the factors with the highest priority.

7) Determining the importance of strategic options according to each of these steps: Based on the prioritization of the SWOT sub-factors, the strategies are first developed, and then the strategy priority was calculated with respect to each of the sub-factors of the SWOT using the paired comparison matrix. Strategies are shown in Table 11.

Table11. Final SWOT Strategic Matrix for Success of RPCs in Iran
(Source: Research Finding, 2017)

External Factors		
SWOT matrix	Opportunities(O) $O_1,O_2,O_3…O_7$	Threats(T) $T_1,T_2,T_3…T_7$
Strengths **S_1** **S_2** **S_3** **…** **S_7**	SO Maxi-Maxi strategy SO_1. Promoting socio- economic participation and applying multi-level, multi-sectorial, participatory. SO_2. Holistic approaches for RPCs management, and - improving relationships with governmental organizations SO_3. Employment of skilled staff by supervision of state organizations.	ST Maxi-Mini strategy ST_1. Increase member social participation by individual and working empowerment by RPCs for achieving sustainable development Skilled director managers and hardworking staff in RPCs. ST_2. Holistic planning and organization with the participation of the members, Regarding continuous state grants. ST_3. Human and non-human resources should be available and leveraged.
Internal Factors		
Weaknesses **W_1** **W_2** **W_3** **…** **W_7**	WO Mini-Maxi strategy WO_1. Empowering, members, the board of directors by applying scientific and professional in-service educational courses, and being more active with the state regarding technical consultancy. WO_2. Adopting appropriate measures in order to be eligible for financial aid. WO_3. Being more active with the state regarding technical consultancy	WT Mini-Mini strategy WT_1. Increasing member social participation by human capital empowerment that can help member economic participation for supply cash in order to decrease public dependence. WT_2. Strengthening the relation between the RPCs and state organizations to increase technical aid, support for quality development of the RPCs, and modernization of equipment

8) To ranking the strategies applying the opinion of senior managers and pairwise comparisons among options with respect to the sub-factors where the degree of importance to the strategy to each of the sub-factors is determined. For this purpose, a 18 × 4 matrix is devised. The weight of each of the following strategies is shown in the order of S1 to S5, W1 to W5, O1 to O4, and T1 to T4. Table 11 indicates 11 main strategies for sustainable development of RPCs based on interactions between SWOT sub-factors formulated by the senior executives. They identified three SO, ST and WO, and two WT strategies based on the previously identified sub-factors.

In this study, to determine the best strategy, the strategies were ranked by integrating the results of the SWOT matrix consisting of 24 sub-factors in the ANP model as follows: (1) offensive or development strategy (SO) had a score of 0.3243 final priority; (2) competitive or diversity strategies (ST) had a score of 0.3023; (3) conservative strategy (WO) had a score of 0.1909; and (4) defensive strategy (WT) had a score of 0.1825.

$$W_{\text{strategies}} = \begin{bmatrix} W_{SO} \\ W_{ST} \\ W_{WO} \\ W_{WT} \end{bmatrix} = W4 \times \mathrm{W}_{\text{SWOTsub-factors}} = \begin{bmatrix} 0.3243 \\ 0.3023 \\ 0.1909 \\ 0.1825 \end{bmatrix}$$

The final priorities of the strategies are shown in Table 12. They indicate that SO1 (0.1560), ST_2 (0.1490), and WO_1 are the three best SWOT strategies, whereas ST_3 (0.0123) is the weakest SWOT strategies for RPCs sustainable development. It seems that adopting these strategies can play an important role in sustainable development of rural cooperatives and societies. When we employed conventional SWOT methodology, the three most important strategies were SO1, ST2 andWO_1, while the senior executive team believed that the results of ANP-SWOT were closer to the reality of Iran's cooperatives.

Table12. Priorities of the adopted Strategies
(Source: Research Finding, 2017)

Group of Strategies	Strategies	Weight	Ranking
SO (0.3243)	SO1	0.1560	1
	SO2	0.1330	4
	SO3	0.0353	9
ST (0.3023)	ST1	0.1320	5
	ST2	0.1490	2
	ST3	0.0213	11
WO (0.1909)	WO1	0.1410	3
	WO2	0.0407	8
	WO3	0.0295	10
WT (0.1825)	WT1	0.0900	7
	WT2	0.0925	6

5. Discussion and Conclusion

Achieving sustainable development in the third millennium is not only an essential requirement, but also an immediate goal that the cooperative can play an important role in from different aspects. In the RPCs farming systems, the results show that 12 RPCs are in unstable situation, 8 RPCs are in semi-sustainable status, and the 8 remaining companies are in the stable situation. These cooperatives are unstable from environmental and economic dimensions and semi-stable from social dimensions. The increased use of nitrogen fertilizers, phosphates, and agricultural pesticides has led to the environmental instability of this type of farming systems. Furthermore, the internal and external factors affecting the sustainability of RPCs are determined (strengths, weaknesses, opportunities, and threats) in this study.

The results obtained from the strategic analysis indicate five factors as strengths, five factors as weaknesses, four factors as opportunity, and four factors as a threat. Based on the results of ranking strengths, the social participation of cooperative members with a score of 0.0618 was identified as the first priority. These results are in line with the findings by Brisco (2010) and Alexander (2009) who believe that member participation is an important factor influencing achievement in sustainability. Member empowerment through conducting extension classes with a general score of 0.0448 is another important strength in this research. This result is in line with the studies by John (2008), Alexander (2009), and Krishnaraj (2005). It should be noted that along with the positive aspects of the organization that sustains, there are also some negative aspects. The lack of awareness of members of RPCs with a score of 0.0389 was identified as negative aspect, which supports the findings of Lawson's (2006) research. Lack of expertise in the field of agriculture with score of 0.0358 is the second priority. In addition to the positive and negative internal factors, there are also a number of positive and negative external factors in which this group of factors has been identified and ranked. The most important external opportunities respectively include: (1) State grants for the development and purchase of agricultural equipment with a score of 0.0710; (2) Low directions of regulating and supporting activities with a score of 0.0681; (3) Supervision of state organizations with score of 0.0630; (4) Monitoring and technical advice represented by the Ministry of agriculture with a score of 0.0566 are identified as the most important external opportunities, which supports the findings of Prneetvatakul's (2011) research. On the other hand, the most important external threats respectively include: (1) Reduction of state aid to RPCs with a score of 0.0300; (2) High interest bank rate with a score of 0.0270, (3) Weakness of the union of RPCs for supporting RPCs with a score of 0.0241; and (4) Establishing rival societies at the rural level with a score of 0.0240. The result is in line with the studies by Saadati (2009) and Khajehshahkoei, (2011).

According to the results obtained by adopting the SWOT factors and their combination regarding the priority in higher ranking SWOT matrix in this study, the following four strategies are proposed:

1. Offensive or development strategy (SO): Promoting self-reliance through increased participation in RPCs, promoting member talent, applying multi-level, multi-sectorial,

participatory, and holistic approaches for RPCs management, and improving relationships with governmental and non-governmental organizations (government grants).

2. Competitive or diversity strategy (ST): Increasing members' social participation by member empowerment in RPCs in order to achieve sustainable development.

3. Conservatively or reload strategy (WO): Empowering, members, the board of directors, and directing manager, by applying scientific and professional in-service educational courses, adopting appropriate measures in order to be eligible for financial aid, and being more active as to state technical consultancy.

4. Defensive strategy (WT): Increasing member social participation by human capital empowering that can assist members' economic participation for financial resources in order to decrease state dependency.

In this study, to determine the best strategy, the strategies were ranked by integrating the results of the SWOT matrix consisting of 18 sub-factors in the ANP model in the following: (1) offensive or development strategy (SO) with a score of 0.3243 final priority; (2) competitive or diversity strategies (ST) with a score of 0.3023; (3) conservative strategy (WO) with a score of .01909; and (4) defensive strategy (WT) with a score of 0.1825. The offensive strategy is the best strategy; that is, RPCs can be sustained by applying their internal strengths and external opportunities. The offensive or development strategy (SO) being the top strategy does not significantly affect other strategies; the three other strategies can apply as complementary and alternative ones.

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سنجش پایداری نظام بهره‌برداری تعاونی‌های تولید روستایی و ارائه راهبردهای موثر بر دستیابی به آن در استان اصفهان

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چکیده مبسوط

۱. مقدمه

از آن جا که پایداری در کشاورزی خود تابعی از عوامل اکولوژیکی و اقتصادی و اجتماعی داخلی و خارجی است، از این رو تغییرات آن در ساختارهای کشاورزی نیز تاثیرگذار خواهد بود. روند رو به رشد تقطیع اراضی به قطعات کوچک در نتیجه قانون ارث، کاهش بهره وری اراضی، آب، نیروی انسانی و سرمایه در بخش کشاورزی که از پیامد های منفی اصلاحات اراضی دهه‌ی ۱۳۴۰ بوده، راهبرد ایجاد تعاونی‌های تولید روستایی در دستور کار دولت بود. رسالت اصلی تعاونی‌های تولید روستایی جلوگیری از مهاجرت بی‌رویه روستائیان به شهرها و برقراری توازن بین توسعه مناطق روستایی و شهری و استفاده بهینه از منابع آب و خاک تعریف شده است. در حال حاضر در استان اصفهان در حال حاضر، ۵۵ تعاونی تولید روستایی در۱۳ شهرستان این استان فعالیت می کنند که بطور عمده در دو دهه اخیر تاسیس شده اند. از مجموع تعاونی های تولید کشور ۱۳ درصد کشاورزان عضو تعاونی ها هستند و ۸ درصد اراضی در کشور و ۲۸ درصد در استان اصفهان تحت پوشش تعاونی های تولید کشور در این استان قرار دارند. لذا هدف اصلی این تحقیق سنجش پایداری نظام بهره‌برداری تعاونی تولید روستایی و تحلیل استراتژیک عوامل موثر بر دستیابی تعاونی به توسعه پایدار در استان اصفهان است.

۲. مبانی نظری تحقیق

یک جامعه در صورتی پایدار است که در آن هم شرایط انسانی و هم وضعیت اکوسیستم رضایت بخش یا در حال بهبود باشد. بر اساس این تعریف یک نظام بهره‌برداری هنگامی پایدار است که کشاورزان و اعضای آن نظام به شکلی از محیط زیست استفاده کنند که ضمن استفاده از ظرفیت مناسب تولید، آسیب کمتری به محیط زیست وارد نماید. از مهم‌ترین اجزاء هر نظام بهره‌برداری، شیوه و روش تولید محصول می‌باشد که تحت عنوان کشاورزی پایدار قلمداد می‌شود. پایداری اقتصادی بر حفظ یا ارتقای شرایط اقتصادی تاکید دارد.. پایداری اجتماعی نظام بهره‌برداری بیان‌گر استقلال، برابری و بهبود شرایط زندگی کشاورزان هر نظام بهره‌برداری می‌باشد. دستیابی به این هدف مستلزم سرمایه اجتماعی، گسترش مشارکت، کمک به فقرزدایی، توانمندسازی و بهبود کیفیت زندگی است. مهم‌ترین بعد پایداری بر اساس اهداف کمیسیون برانتلند بعد زیست محیطی می‌باشد. این بدان علت است که پارادایم توسعه پایدار فی‌نفسه در حمایت از محیط زیست شکل گرفت. این مفهوم از نظر به معنای سازگاری یا سلامت اکولوژیک است.

پژوهش‌گران سعی در معرفی مدل‌های اثر بخش به منظور سنجش پایداری نمودند. به طور کلی روش جامع و مانعی در خصوص سنجش پایداری کلیه سیستم‌ها وجود ندارد اما تکنیکی که در بین کلیه روش‌ها مشترک است به کارگیری شاخص‌های پایداری می‌باشد.. از این رو یک ارزیابی همه جانبه پایداری، باید ابعاد زیست محیطی، اقتصادی و اجتماعی آن را در نظر بگیرد. سنجش پایداری شامل تعیین نگرش‌های مهم و یافتن یک استاندارد یگانه برای رفاه است که می‌تواند آن‌ها را به درون یک مقیاس پایداری ترکیبی هدایت نماید. محققان بسیاری در سنجش پایداری نظام‌های بهره برداری از مولفه‌های اقتصادی، اجتماعی و زیست محیطی به صورت هم زمان بهره برده‌اند.

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۳. روش تحقیق

پژوهش حاضر از جمله پژوهش‌های ترکیبی(کمی و کیفی) به شمار می‌رود. بر اساس هدف، جـز تحقیقـات کـاربردی، بـر اسـاس نحـوه گردآوری داده ها (طرح تحقیـق)، توصـیفی (غیـر آزمایشـی) و از دسته‌ی تحقیقات پیمایشی می‌باشد. اطلاعات مورد نیاز این پژوهش به صورت اسنادی و میدانی جمع‌آوری گردیـد. بـه منظـور بررسـی وضعیت پایداری عوامل اقتصادی، اجتماعی و زیست محیطی موثر بر پایداری نظام بهره‌برداری شاخص کلی پایداری ساخته می شود. در این تحقیق برای تحلیل اطلاعـات گـرآوری شـده از روش آنتروپـی شانون استفاده شد. از روش ترکیبی، تحلیل محتوای کیفـی و فـن SWOT راهبردی جهت تدوین راهبرد موثر بر دسـتیابی تعـاونی-های تولید روستایی به پایداری استفاده شد. قلمرو جغرافیایی ایـن تحقیق استان اصفهان بوده و جامعه آماری شامل ۲۸ شرکت تعاونی تولید روستایی فعال می‌باشد.

۴. یافته‌های تحقیق

نتایج بدست آمده نشان می‌دهد. همنین در ایـن مطالعـه مشـخص گردید عوامل موثر بر پایداری شرکت‌های تعاونی، تحت تاثیر عوامل درونی و بیرونی (نقاط قـوت، نقـاط ضـعف، فرصـت‌هـا و تهدیـدها) مختلفی قرار دارد. نتایج نشان داد که۵ طبقه به عنوان نقاط قوت،۵ طبقه به عنوان نقاط ضعف، ۴ طبقه به عنوان فرصت و ۴ طبقـه بـه عنوان تهدید مشخص گردید. بر اساس نتایج بدست آمـده از رتبـه-بندی نقاط قوت، مشارکت اجتماعی و همفکری اعضـای تعـاونی بـه عنوان اولویت اول شناخته شـد. در کنـار جنبـه‌هـای مثبـت درون سازمانی که باعث پایداری می‌شوند، برخی جنبه‌های درونـی منفـی هم وجود دارد. عدم آگاهی و شناخت اعضا از شرکت است علاوه بـر عوامل درونی مثبت و منفی یک دسته عوامل بیرونی مثبت و منفـی نیز وجود دارد که در این پژوهش این دسته عوامل شناسایی و رتبه-بندی شده‌اند. اعطای کمک بلاعـوض دولـت بـه عنـوان مهـم‌تـرین فرصت بیرونی شناخته شدند. همچنـین کـاهش کمـک دولـت بـه شرکت در سنوات اخیـر بـه عنـوان مهـم‌تـرین تهدیـدهای بیرونـی شناخته شدند.

۵. بحث و نتیجه‌گیری

در نظام بهره‌برداری تعاونی تولید، ۱۲ شرکت در وضعیت ناپایدار، ۸ تعاونی در وضعیت نیمـه پایـدار و ۸ شـرکت باقیمانـده در وضـعیت پایدار قرار دارند. این تعاونی‌ها، از بعد اقتصادی در وضعیت ناپایـدار، اجتماعی در وضـعیت نیمـه پایـدار و زیسـت محیطـی در وضـعیت ناپایدار قرار دارد با توجه به نتایج این تحقیق، راهبردهای چهارگانـه راهبرد توسعه‌ای، راهبرد رقابتی،راهبرد بازنگری و راهبرد تـدافعی جهت ارتقای سطح پایداری شرکت‌هـا شناسـایی شـده اسـت. لـذا افزایش مشارکت اجتماعی اعضا از طریق توانمندسازی سرمایه‌هـای انسانی می‌تواند بسترسـاز مشـارکت اقتصـادی اعضـا جهـت تـامین نقدینگی شرکت به منظور کاهش وابستگی به دولت گردد.

کلمات کلیدی: توسعه پایـدار، تعـاونی تولیـد روسـتایی، سـنجش پایداری، نظام بهره‌برداری.

تشکر و قدردانی- پژوهش حاصل حامی مـالی نداشـته و حاصـل فعالیت علمی نویسندگان است.

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