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Identification of Strategies for Sustainable Development of Rice Production in Guilan Province Using SWOT Analysis

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Abstract

Sustainable development is one of the most important issues that can be considered from different aspects and in different contexts including sustainable agriculture. This study aimed to investigate the main strategies related to sustainable development of rice production as an important agricultural product in Guilan Province using a SWOT analysis. To this end, different internal (strengths and weaknesses) and external (opportunities and threats) factors affecting rice production development were reviewed in the literature. Next, a questionnaire was designed based on the potential opportunities, threats, strengths and weaknesses in the literature and the initial interview of the experts; then, the experts were asked to determine the importance of factors on a five-point Likert type scale. The results showed that the rice production received the total scores of 2.14 and 2.24 for the External Factor Evaluation (EFE) matrix and the Internal Factor Evaluation (IFE) matrix, respectively, indicating the ineffectiveness of the industry's strategies. These scores mapped the position of rice production in Guilan Province. Finally, a number of strategies for sustainable development of rice crop were outlined in order to reduce the weaknesses, avoid the threats, improve the strengths, and grasp the opportunities for the rice production of Guilan Province.

Keywords:
rice production, strategy formulation, sustainable development, SWOT analysis

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INTRODUCTION

Experts and economists believe that in understanding the relationship among economic growth, social, and environmental dimensions of development, unilateral concentration on economic growth makes agricultural development inevitably unsustainable, which means it cannot be continued for a longtime (Soubbotina, 2004). During the last three decades, the concept of sustainability has attracted a lot of attention toward the deterioration of natural resources, consumers' concerns about quality of food, as well as degradation of life quality in rural communities (Shiri et al., 2012).

Sustainable development is a concept that can be considered from many different aspects and in different contexts including exchange values (Allahyari et al., 2008). Jeopardizing environmental quality, providing moral development, changing toward better future, providing social reorganization (Gupta, 1998), producing new capacities, empowering people and increasing knowledge (Bosshaq et al., 2013) that somehow help clarify the concept of sustainable development, which is the development that meets current needs without jeopardizing the ability of future generations in meeting their needs (WCED, 1987). Taylor (2002) believes that the concept of sustainable development is an important stage of environmental theory, because it posits how the society should organize itself. Therefore, sustainable development represents a philosophy with economic, social, and environmental dimensions[1] (Tanguay et al., 2010).

Environmental sustainability is achieved through the protection and effective management of natural resources. Economic sustainability is attained by a mix of occupations that provide long-term and stable incomes. Finally, social sustainability is ensured by means of active community participation and a strong civil society (Goodland, 1995). Furthermore, these three dimensions are fundamentally inseparable aspects of a whole. All three are essential, and thus, no one or two alone would suffice to ensure sustainability (Ikerd et al., 1996).

The production of sufficient food to feed an ever-increasing population is the most serious challenge facing mankind today (Essiet, 2001). The imbalance between the population growth and agricultural production is a real challenge in most developing countries. The growing pressures of population and the limited food supply have aroused global interest in research pertaining to environment, food, and nutrition (Burke et al., 2005). Although agriculture plays a main role in the economy, there have been concerns about the ability of the sector to alleviate rural poverty and to provide food security as well as stable incomes to farmers and other rural people. These concerns have been raised, because the farming environment and rural areas have faced unprecedented environmental problems over, at least, the last two decades (Tatlidil et al., 2009). In Iran, like other developing countries, agriculture is one of the most important economic sectors and contributes a considerably high percentage of production and employment (Ommani et al., 2009).

Sustainable agriculture is one of the important aspects of sustainable development. Basically, sustainable agriculture has no single meaning (De Koeijer et al., 2002). However, as Hansen (1996) argues, there are numerous various scientific conditions for agricultural sustainability that can be interpreted as the ability of an agricultural system to satisfy different requirements over time. It is argued that sustainable agriculture as a philosophy is rooted in a set of values and is based on human targets and long-term understanding of impacts of human activities on the environment and other animal species (MacRae et al., 1990). To ensure environmental, economic, and social sustainability, farmers must adopt different farm-level practices such as judicious use of chemicals, integrated pest management, adequate irrigation, and proper care of plant and animal health (Sadati et al., 2010).

Rice is one of the most important products in the world and a main food for more than 40% of the world's population (FAO, 2013). Rice, as the second most important product of Iran after wheat, has a great importance in nutrition of Iranian community. In Iran, a big share of rice cultivation is contributed by two Northern

[1] *Recently, a fourth dimension has been added:– the institutional dimension of development*

provinces that is, Guilan and Mazandaran. These two provinces are the main hub of rice cultivation and production in Iran. As a case studied in this research, Guilan Province is one of the most important hubs of rice production in Iran and provides, on average, 26 percent of annual rice production in Iran (Iran's Agricultural Statistics, 2013).

In recent years, several problems have occurred in the field of environmental degradation in Guilan Province because of consecutive cultivation of rice paddies without appropriate utilization of productive resources (Daryaee et al., 2011). Inordinate use of fertilizers, especially nitrogen fertilizers (200-300 kg per Hectare); possibility of water pollution, especially underground water and occasional entry of these synthetics into drinkable water resources, has posed many health problems to people and other organisms, in particular, fishes (Khalili et al., 2009). Excessive use of chemical pesticides has caused many harmful effects such as resistant pests, decreasing pesticides impact, extinction of species, and destruction of natural habitats. In addition, burning farm leftovers has caused the loss of organic substances and the increased need for fertilizer. Besides, consecutive plowing has indirectly resulted in the rapid decomposition of organic substances and reduction of soil humus (Daryaee et al., 2014; Nick Nezhad, 2008). Regarding the problems mentioned, regional differences make sustainable development mandatory in order to do proper planning for the existing potentials, and it requires expert assessment and evaluation. Recognition and analysis of the factors affecting each product can be effective for sustainable development of these products in favor of desirable utilization of provided resources, improvement of self-reliance and self-regulation of agricultural ecosystem, lowering of wastes, as well as minimization of environmental, social, and economic impacts. Therefore, the utilization of models related to the identification of agricultural capacities in each region is helpful in preventing the emergence of many problems, because the models are practical tools that help reach widespread perception of facts (Singh & Dhillon, 2004).

There are many models to recognize and analyze factors affecting a product. In the meantime, SWOT analysis is among tools that are used to analyze internal and external strategic factors in the strategy development stage. This matrix evaluates strengths, weaknesses, opportunities, and threats facing organization (Yuksel & Dagdeviren, 2007). SWOT analysis is based on the premise that an effective strategy maximizes strengths and opportunities, while minimizing weaknesses and threats (Dyson, 2004). This simple premise will have a major effect on the selection and formulation of effective strategy in case of proper implementation (Pearce & Robinson, 2003). This method, which is used to a great extent in strategic development, identifies all factors influencing the operating environment of organizations and reflects strategies tailored to current situation (Shrestha et al., 2004).

Falsolayman and Sadeghi (2013), Ghorbani et al. (2015), Javanmard and Mahmoudi (2008) Ommani (2011) and Reihanian et al. (2012) are examples of the studies employing the SWOT analysis for sustainable development. In another study, Vali Poor et al. (2013) formulated strategies for urban agriculture development in Dogonbadan using the SWOT analysis. Sadeghi et al. (2011) formulated advertising strategies for pistachio export in Kerman Province using the SWOT analysis. Sojasi Gheidari et al. (2011) proposed strategies for the development of agricultural entrepreneurship in rural areas using a combination of multivariate analysis (MCDM) and the SWOT. Fakhimi Azar et al. (2011) developed a strategic plan for Jahad-e Agriculture Organization of Eastern Azerbaijan Province using a combination of AHP and the SWOT.

Efficient utilization of resources in a way that is commensurate with their existing capacities seems to be necessary for agricultural sector to benefit from ascending trends of development. This concept lies in sustainable development. Hence, it seems that studying this matter using development models can be effective in providing programs and strengthening economic, social, and environmental aspects for rice farmers in the future. Therefore, the aim of this research is to identify the key internal and external factors affecting rice pro-

duction in Guilan Province and to review the appropriate strategies for sustainable development of this product in the region using the SWOT analysis.

MATERIALS AND METHODS

The study area

Guilan Province with the area of 14,711 km^2 is located in the North of Iran covering the geographical coordinates of 48°34'25" W to 50°26'42' E and 36°36'3"S to 38°27'7" N. Rasht, the central city of the province, is 355 km west of the capital of Iran (Tehran) (Statistical Yearbook of Guilan Province, 2013).

Guilan Province is covered with coastal and mountainous areas and plains. Lowlands are the vastest area of the province, comprising most of farmland in the region. The soil of Guilan plain is sedimentary because of sediments from rivers in the region. The land in this area in not too steep and has good drainage, which makes them the best lands capable of farming. This type of soil is used to cultivate products such as rice, fruit trees, tobacco plants, and summer products. In Iran, Guilan Province as the case of this study with more than 26 percent of production and 31.7 percent of rice paddy cultivation is ranked the second in terms of production and cultivation of rice crop after Mazandaran Province. In this province, more than 150,000 farmers grow rice in more than 180,000 ha of fertile lands annually, and this is the most important agricultural activity in the province. Economic structure of the province is based on agriculture with a focus on rice production (Iran's Agricultural Statistics, 2013). Figure 1 shows the distribution of rice paddies in Guilan Province.

The sampling method

The research population consisted of the managers and specialists of Jahad-e Agriculture Organization (JAO), Rice Product Research Center (RPRC), as well as rice industry scholars/experts in Guilan Province. According to Eq. (1), the sample size was estimated based on the Cochran's formula for finite population. The formula including the specifications of the initial sample is shown below:

$$n=(N.t^2.s^2)/((N-1).d^2+t^2.s^2) \cong 91 \quad (1)$$

where:

n is the sample size (?),

N is the population size (147),

t is the test statistic for 0.95 confidence level (1.96),

s^2 is the variance of responses in the pilot study (0.884),

d is the preferred likelihood accuracy (0.12). The expert recommendation for d was 10% which is a common level for a desired precision (Azadi et al., 2013). However, a slightly more precision (12%) was considered.

Data collection

A questionnaire was used to collect data from the experts in a pilot study. It included a list of strengths, weaknesses, opportunities, and threats facing rice industry, which were adjusted according to the indexes of Fifth Development Plan of Agricultural Sector.

A pilot study was conducted to measure the reliability of the questionnaire: Thirty questionnaires in the study area were administered to managers and experts from Jahad-e Agriculture Organization of Guilan Province and professors not mentioned in the investigation. Cronbach's alpha coefficient was estimated at 0.87, which

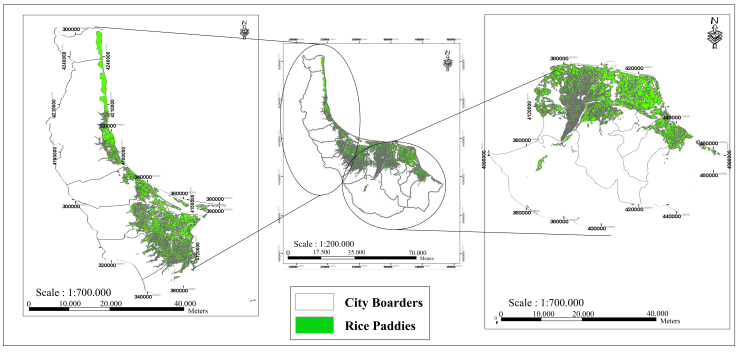

Figure 1: Distribution of rice paddies in Guilan Province

indicates the high internal consistency of the questionnaire.

An empirical study was conducted to answer the research questions, and a questionnaire was developed to collect the data. In the first step, 30 experts participating in the agricultural decisions at the senior level were chosen through a systematic random sampling approach. Next, the experts were asked to fill a questionnaire (developed based on the factors well supported by literature and the experts' opinions from the practical point of view) containing 66 items, 14 for strengths, 17 for weaknesses, 20 for threats and 15 for opportunities. Items were measured on a five-point Likert scale with extreme points of "strongly unimportant (1)" and "strongly important (5)". Next, the final sample size to conduct the research study was estimated at 91 based on the Cochran's formula, and 61 experts out of 91 randomly selected participants attended to fill out the questionnaire. In the second step, the possible list of strengths, weaknesses, opportunities, and threats was analyzed based on the data obtained from the questionnaire. The researchers finalized 43 factors based on the ranking of 66 factors (9 for strengths, 12 for weaknesses, 11 for threats and 11 for opportunities) of the questionnaire. Tables 1 and 2 present the most important factors in sustainable development factors and their normalized importance scores (relative weights) obtained through data collection.

The SWOT analysis

Harvard Business School Faculty developed the SWOT organizing framework in the early 1960s drawing upon Selznick's idea of matching an organization's internal factors (capabilities, resources, and limitations) with its external environment as a first step in the process of strategy development (Bower, 2008).

Identifying its strengths, weaknesses, opportunities and threats, the organization can develop various strategies so as to focus on its strengths, minimize threats, take the greatest possible advantage of opportunities available to organization, and use them to defend against threats. The strengths and weaknesses are revealed by an internal environment appraisal, whereas the opportunities and threats are revealed by an external environment appraisal (Dyson, 2004).

The purpose of a Strengths, Weaknesses, Opportunities and Threats framework is to get managers thinking to anything that can potentially impact the success of the product or industry. The internal environment of the company consists of variables within the company itself, of which the business management of the company does not have an influence in the short term. The external environment consists of variables existing outside the company, which in the short term are not under the control of the company. These variables form the context in which the company exists and functions (Houben et al., 1999).

Strategy formulation is the process of developing long-term plans to effectively respond to the environmental opportunities and threats in the light of the strengths and weaknesses (Houben et al., 1999). The consensus of Strengths, Weaknesses, Opportunities and Threats form a 2*2 matrix which is called SWOT and can be used for developing different strategies to achieve objectives.

The current research study has been done to identify the potential strategies and to prioritize and also to create a common vision for accomplishment of the development strategy. Although SWOT analysis is a research method which has been generally used in business plans, nowadays it is used to evaluate issues and policies related to decision-making and also to evaluate sustainable agriculture in a systematic way (Falsolayman & Sadeghi, 2013). The internal and external environmental factors have important roles in scanning strategic planning and are considered as major components of sustainable development process. This strategic environmental analysis is useful in formulation and selection of a strategy (Reihanian et al., 2012), since it may help researchers to gain insight into the past and to think of possible solutions for existing or potential problems (Ommani, 2011). A SWOT analysis can be carried out for a product, place, industry or person. It involves specifying the objective of the business venture or project as well as identifying the internal and external factors

that are either favorable or unfavorable for achieving that objective (Ghorbani et al., 2015).

In this study, according to the strategy formulation models and patterns, the key internal and external factors affecting rice production in Guilan Province were studied and identified. After determining the strengths, weaknesses, opportunities and threats, the study findings were analyzed using the SWOT model that included Internal Factors Evaluation Matrix (IFEM), External Factors Evaluation Matrix (EFEM), and a combination of internal and external factors. Finally, different strategies for the various modes of SWOT (including ST, WO, SO and WT) were adopted to introduce approaches resulting from this analysis as a useful strategy to overcome current undesirable situation and to achieve ascending trend of development which aims at sustainable development. The following section elaborates the scoring process:

To evaluate internal and external factors (to define normalized coefficient), first, weighted scores between zero (unimportant) to one (very important) were assigned to each factor in such a way that the sum of the weighted scores could equal unity (the second column in Tables

Table 1
External Factors Evaluation Matrix (EFEM)

External Strategic Factors	Weight Factor (Normalized	Current Situation Score	Weighted Score
Opportunities			
O_1. Increasing demand for rice product	0.046	2	0.092
O_2. Increasing the production of agricultural products	0.046	2	0.092
O_3. Existence of appropriate capabilities/capacities to develop alternative industries	0.048	3	0.144
O_4. Availability of regional/domestic markets and development of rice export (airports, border markets and etc.)	0.046	1	0.046
O_5. Availability of new technologies to increase resources productivity	0.044	3	0.132
O_6. Possibility of value creation in rice product as well as other agricultural product	0.050	2	0.1
O_7. The distinctive position of Guilan province in rice production (the second largest rice producer in Iran)	0.054	3	0.162
O_8. A considerable number of graduates and experts in the province	0.046	4	0.184
O_9. Availability of considerable workforce in the province	0.041	3	0.123
O_{10}. The ability to manufacture and develop agricultural equipments and to produce high quality chemical, organic and biological agricultural products	0.040	2	0.080
O_{11}.The existence of necessary infrastructure for utilization of rainfalls, surface water and underground streams	0.039	1	0.039
Threats			
T_1. Increasing rate of change in farmland cultivation	0.053	2	0.106
T_2. Fluctuations in price of agricultural products	0.042	2	0.084
T_3. Inappropriate attitude toward agricultural industry and its role in economic development	0.043	2	0.086
T_4. The risk of entering plant pests and diseases to the province	0.042	2	0.084
T_5. Lack of sustainable rural development, workforce retention (especially young people) and increasing the average age of farmers	0.047	3	0.141
T_6. Natural disasters such as drought, flood, frost etc.	0.042	2	0.084
T_7. Inefficiencies of agribusiness	0.044	2	0.088
T_8. Lack of financial resources and investment in agriculture sector	0.042	2	0.084
T_9. Inconsistency of intra-industrial policies with requirements of agriculture industry	0.050	1	0.050
T_{10}.Inadequacy of water management in agricultural industry (poor delivery of water among farmers)	0.047	2	0.094
T_{11}. Decreasing quality and quantity of water resources	0.048	1	0.048
Total	1		2.14

Table 2
Internal Factors Evaluation Matrix (IFEM)

Internal Strategic Factors	Weighted Factor (normalized)	Current Situation Scores	Weighted Scores
Strengths			
S_1. Indigenous experience and knowledge about rice production	0.054	3	0.162
S_2. Fertile rice paddies or lands with susceptible soil	0.056	3	0.168
S_3. Proper climatic conditions and vast rice fields	0.053	3	0.159
S_4. High experienced experts in detection and control of pests and diseases of rice in the province	0.042	3	0.126
S_5. Wide variety of modified rice with high quality in the province	0.042	3	0.126
S_6. Significant institutional structures for agricultural facilities/crops in the province	0.049	3	0.147
S_7. Academic /research and development (R&D)centers in the province	0.055	4	0.220
S_8. The rich databases of various academic and scholarly studies on rice product	0.051	4	0.204
S_9. Wide network of rural cooperative centers and institutes related to the rice product in the province	0.035	3	0.105
Weaknesses			
W_1. Fixed cost of rice in comparison to global price	0.044	1	0.044
W_2. Lack of advanced agricultural machinery and use of traditional ways of rice production	0.041	2	0.082
W_3. Weakness of rice guild and pricing /advertising policies	0.053	1	0.053
W_4. Weak position of consultants in rice marketing	0.06	1	0.06
W_5. Smallholding system and lack of integration and dispersal of rice paddies	0.055	2	0.110
W_6. Insufficient investment in rice production and uneconomical rice cultivation as compared to the other economic activities in the province	0.038	2	0.076
W_7. Low productivity of production facilities	0.055	1	0.055
W_8. Contradiction and inefficiency of some existing procedures, rules and regulations as well as poor supervision over implementation of laws for developing rice product in the province	0.040	1	0.040
W_9. Weak linkage between the findings of applied researches and their implementation in agricultural sector	0.038	2	0.076
W_{10}. Unsuitable insurance services for rice product	0.050	1	0.050
W_{11}. Weakness in integrated management planning to detect harmful factors for rice products in the province	0.037	2	0.074
W_{12}. Nonconformity of farmers with sustainable agriculture principles	0.052	2	0.104
Total	1		2.24

1 and 2). To this end, a five-point Likert scale was used. First, the total scores were calculated for each question based on the judgment of samples. Then, mean total scores were derived in terms of average weight. Next, the average weights were normalized to gain weights between zero and one for each factor and the total weight equaled one, accordingly. Obviously, the higher the total scores of factors, the higher the average weight, and therefore, the higher its normalized ratio. These ratios indicate the importance of each factor based on respondents' opinions and the impact of that factor on current and future success. Next, according to the current condition of each factor, a score ranging from 1 to 4 was allocated to the current situation score column using the Delphi method (the 3rd column in Tables 1 and 2). (It is worth noting that in IFE Matrix, scores 1 and 2 were assigned to weaknesses and scores 3 and 4 were assigned to strengths). Finally, the weighted scores of each factor (multiple product of 2nd and 3rd columns of Tables 1 and 2) and total weighted score of factors were calculated.

RESULTS

Once the required data were collected, a

Table 3
Rice Product Development Strategies Based on SWOT Analysis

SWOT Strategies
SO Strategies
SO_1: Quantitative increase of rice production with regard to the lands with fertile soil, desirable rice paddies and suitable climatic conditions in the region (S_2-S_3-S_5-O_1-O_2)
SO_2: Development of mechanization of agricultural sector with regard to extensive network of cooperatives and unions of agricultural sector in the province (S_9-O_2-O_3-O_5-O_{10})
SO_3: To increase the value of rice product through improving rice quality with regard to study and research facilities as well as utilizing results of studies related to rice product (S_5-S_7-S_8-O_5-O_6)
WO Strategies
WO_1: Development of comprehensive mechanization project and modification of plantation patterns with regard to existing potentials of achieving innovative technologies and capability of manufacturing efficient agricultural equipment in the country (W_1-W_2-W_7-O_3-O_5-O_{10})
WO_2: Increasing irrigation efficiency and productivity of water and soil with regard to related innovative technologies as well as benefitting from graduates of relevant science in the province (W_2-W_7-O_3-O_5-O_8)
WO_3: Using specialists and graduates of province as consultant and study centers in rice product marketing (W_1-W_3-W_4-O_4-O_8)
ST Strategies
ST_1: Strengthening supportive technical and executive laws, regulations and rules to help sustainable development of rural areas, reduction or disposal of rice paddy use changes and fragmentation of lands under rice cultivation (T_1-T_5-T_9-S_6-S_9)
ST_2: Planning to prevent and mitigate the effects of natural disasters, pesticides and diseases through development of early warning systems and control networks with regard to local experience and knowledge as well as research centers (S_1-S_4-S_6-S_7-S_8-T_4-T_6)
ST_3: Developing appropriate mechanisms with scientific and technical criteria for allocating funds and investing in activities related to rice production with regard to extensive areas of activity for this product in the province (S_1-S_2-S_3-T_3-T_8)
ST_4: Cultivation of rice varieties with the approach of improving efficiency of water resources aimed at reducing the quantitative and qualitative loss of water resources (S_1-S_2-S_3-T_{10}-T_{11})
WT Strategies
WT_1: Coordination between cooperation sectors of the province to solve the problems of smallholding system, rice paddy use change and low efficiency of unions related to the rice product (W_3-W_5-W_8-T_1-T_7-T_9)
WT_2: Improving insurance services related to rice product regarding to the risks such as natural disasters and rice pests and diseases (W_{10}-W_{11}-T_4-T_6)
WT_3: Attracting investments to develop facilities and infrastructure required for rice production (W_2-W_6-T_3-T_8)
WT_4: Studying, planning and implementing effective mechanisms to reduce the cost of rice production to reduce fixed price of product and also to stabilize the market (W_1-W_3-W_4-W_9-T_2-T_9)
WT_5: Utilizing methods of extension education in order to promote and teach sustainable agriculture through increasing the level of knowledge and public awareness among farmers on organic agriculture (W_{12}-T_1-T_3-T_5-T_{11})

SWOT analysis was employed to evaluate the feasibility of sustainable development of rice production in Guilan Province through analyzing the results. The results of the analysis are presented in the following sections.

External Factors Evaluation Matrix (EFEM)

As Table 1 shows, the number of 11 external opportunities and 11 external threats were identified as external key factors facing rice production in Guilan Province. "considerable number of graduates and experts" as well as "the distinctive position of Guilan Province in rice production" with the corresponding weighted scores of 0.184 and 0.162 were the most important opportunities facing rice products in the region. In the case of threats facing rice production in the studied region, the factors of "lack of sustainable rural development, workforce retention (especially young people) and increasing the average age of farmers" were the most important factors among the threats, which was weighted as 0.141. In addition, the factor of "increasing rate of change in farmland cultivation" with a score of 0.106 was the second most important rice production threat in Guilan Province.

According to Table 1, total weighted score of

external factors for rice production in Guilan Province is 2.14 that was lower than final mean total scores (2.5) which represents threats overwhelming opportunity (David, 2007). Therefore, rice production in Guilan Province did not have a satisfactory situation in terms of external factors. Taking advantage of opportunities and trying to reduce threats might help leaving the current adverse condition.

Internal Factors Evaluation Matrix (IFEM)

The results of Internal Factors Matrix were analyzed and represented in Table 2. Accordingly, nine internal strengths and 12 internal weaknesses were identified as internal key factors of rice production in Guilan Province. "academic/research and development (R&D) centers in the province" in agriculture sector in Guilan Province was the most significant strength. This factor gained the score of 0.22 among nine introduced strengths. "the rich databases of various academic and scholarly studies on rice product" and "Fertile rice paddies or lands with susceptible soil" were ranked the second and third critical factors with the weighted factors of 0.204 and 0.168, respectively. In the field of weaknesses of rice production in the region, "smallholding system and lack of integration and dispersal of rice paddies" as well as "nonconformity of farmers with sustainable agriculture principles" were ranked the first and second weaknesses with the scores of 0.11 and 0.104, respectively.

According to Table 2, the total weighted score of internal factors matrix was equal to 2.24 for rice production in Guilan Province. This score was lower than the average mean of matrix (2.5), which indicates the dominance of weaknesses of rice over its strengths in the region (David, 2007). It is worth noting that the quantitative results obtained from the internal and external factor matrixes provide the possibility of offering different strategies in effective manner.

SWOT strategies

After selection and evaluation of key internal and external factors and identification of relationships between their attributes, four types of strategies were adopted that can be used effectively for sustainable development of rice in Guilan Province. For example, the relationship between Strengths and Opportunities (SO) could indicate good condition of rice crop of province and provides opportunity to take advantage of an aggressive strategy. These strategies suggest moving toward ideal situation, by the means of which we can use all positive points to maximize the opportunities. Furthermore, interactions between Weaknesses and Opportunities (WO) can be used as a potential for overview strategies. The aim of these strategies is to minimize weaknesses and maximize opportunities. Moreover, the relationship between Strengths and Threats (ST) can provide possibility to take advantage of diverse strategies. In ST strategy which focuses on strengths and threats, the aim is to maximize the utilization of strengths of rice crop in Guilan Province to deal with external threats and to minimize them. Finally, the interactions between Weaknesses and Threats (WT) can be considered as a potential warning and advice to make use of defensive strategies. These strategies seek to minimize weaknesses and threats. In this case, which is the most worrying situation, an urgent need is felt to reevaluate and reform the strategic policies.

As SWOT matrix in Table 3 shows, 15 key strategies for sustainable development of rice production in Guilan Province is set by pairwise matching of SO, WO, ST, WT.

CONCLUSION

This study provides a systematic manner for rice product assessment using SWOT analysis. It did a qualitative assessment considering strengths, opportunities, weaknesses, and threats jeopardizing rice production to obtain strategies for its sustainable development. An important reason for the lack of sustainable development in the region is the data shortage due to the lack of studies on strategies for rice production development. The main issues influencing rice product development in Guilan Province were identified by the SWOT analysis that resulted in criticizing the current and future situation of rice production in Guilan Province. The results from internal and external environment analysis

show that the total weighted score of external factors affecting rice production is 2.14, which suggests the predominance of threats over opportunities, which in turn indicates that rice production industry has been reacted somewhat weakly to threats and opportunities. In addition, the total weighted score of internal factors was calculated as 2.24 which shows weakness of rice production industry in terms of internal factors. In the next step, using cross product of strengths with opportunities and threats as well as weaknesses with opportunities and threats in the SWOT matrix, rice production development strategies were categorized for the province in four groups of SO, ST, WO and WT, respectively. Guilan Province, a hub of rice production, has a noticeable potential in this context. Yet, the current situation of its rice production is not in line with the sustainability requirements due to the fact that there are no proper management activities in the context of sustainable development in the region. Notwithstanding, there are still hopes in spite of unsustainable condition of rice production in the region. In this context, policy makers and agricultural managers try to resolve current threats and weaknesses using opportunities and strengths.

Given the objectives of this study, which aimed at identifying key internal and external factors influencing rice production in Guilan Province as well as providing strategies for sustainable development of the rice production at the regional level in accordance with the status quo, effective implementation of the proposed strategies would be useful to achieve development goals and to guarantee the movement toward the desired state. Moreover, for the integration of rice product in the path of sustainability based on previous researches and discussions with senior managers and academics of Jahad-e Agricultural Organization, eight essential actions needed to achieve sustainability of rice production are derived from the studies (Alonge & Martin, 1995; Chaharsughi Amin & Mirdamadi, 2008; Falsolayman & Sadeghi, 2013; Pourzand & Bakhshoodeh, 2014; Saifi & Drake, 2008; Taghdisi & Bosshaq, 2012; Zahedi & Najafi, 2006) that are necessary to be implemented along with the proposed strategies. The following practices can significantly orient rice production of the region toward sustainable development:

1- Creating sustainable (sustainable agriculture) development fund for rice production (Zahedi & Najafi, 2006).

2- Proper management of water and soil resources (Pourzand & Bakhshoodeh, 2014; Saifi & Drake, 2008; Taghdisi & Bosshaq, 2012).

3- Decreasing the use of chemical pesticides (Alonge& Martin, 1995; Taghdisi & Bosshaq, 2012).

4- Using cattle in weed management (Chaharsughi Amin & Mirdamadi, 2008).

5- Decreasing the use of chemical fertilizers (Saifi & Drake, 2008; Taghdisi & Bosshaq, 2012).

6- Using green fertilizers (natural fertilizers and manure) (Alonge & Martin, 1995; Taghdisi & Bosshaq, 2012)

7- Biologically adjusting pest control (Chaharsughi Amin & Mirdamadi, 2008; Taghdisi & Bosshaq, 2012)

8- Organizing smallholding system to provide project development and increase production per unit area (Falsolayman & Sadeghi, 2013).

Finally, the present paper provided a valuable, important, and useful technique for reviewing sustainable development of rice production in the studied region. The present research in this context shows that methods like SWOT analysis can be useful tools for better identification of positive and negative factors affecting sustainable development of rice production in Guilan Province and other rice producing provinces in the country. These results may help managers at Jahad-e Agricultural Organization of the province and other organizations to identify sustainable development activities of rice product in the region.

RECOMMENDATIONS

Some weaknesses are evident in evaluation and measurement steps of SWOT analysis (Yuksel & Dagdeviren, 2007). In conventional SWOT analysis, no constraints are imposed on the magnitude of factors to make it possible to determine the impact of each factor on the

strategy or proposed plan (Masozera et al., 2006). In other words, SWOT analysis is not a proper analytical tool to determine the relative importance of factors or capabilities to evaluate appropriateness of available alternatives based on these factors (Kajanus et al., 2004). Also, the results of SWOT analysis is often merely a list or a partial quality examination of the internal and external factors (Kangas et al., 2003). Therefore, it is suggested that in future studies Analytic Hierarchy Process (AHP) be employed to prioritize strategies resulted from SWOT analysis in this study. This combined method was used by Kurttila et al. (2000) for the first time to eliminate the loopholes offered by SWOT analysis in a case study on the certification of planting trees in a forest in Finland. Examples of studies that have followed the method of Kurtilla et al. (2000) include those by Kajanus et al. (2004), Masozera et al. (2006) and Shrestha et al. (2004). These studies, like studies conducted by Kurttila and his colleagues, deal with prioritizing factors and sub-factors of SWOT. AHP is one of the most comprehensive systems designed for decision-makings with multiple criteria and provides the possibility for hierarchal formulation of problems. This process involves different options in decision making and demonstrates the feasibility to analyze the sensitivity of criteria and sub-criteria. In addition, it is binary based which facilitates judgment and calculations and shows the compatibility and incompatibility of decisions, which is the distinctive advantage of this technique in multi-criteria decision making processes. In addition, given the importance of rice production as the second most strategic crop in Iran as well as the need to develop and implement effective mechanisms for sustainable development of this crop in Iran, it is suggested that the present study should be replicated in other provinces of the country that are similarly engaged in rice production and the results be compared.

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