Bulgarian Journal of Agricultural Science, 25 (No 4) 2019, 677–684

Theoretical extension education modeling of citrus culture development in Iran citrus pole

Mohammad A. Ashkar-Ahangarkolaee[1], Malek Mohammadi[2*], Seyed M. Hosseini[3]

[1]*Islamic Azad University, Science and Research Branch, College of Agriculture, Department of Agriculture and Rural Development, 1477893855 Tehran, Iran*
[2]*Islamic Azad University, Science and Research Branch, College of Agriculture, Department of Agricultural Extension and Education, 1477893855 Tehran, Iran*
[3]*University of Tehran, College of Agriculture and Natural Resources, Department of Agricultural Extension and Education, 77871-31587 Karaj – Iran*
**Corresponding author:* AMAlEK@ut.ac.ir

Abstract

Ashkar-Ahangarkolaee, M. A., Mohammadi, M., & Hosseini, S. M. (2019). Theoretical extension education modeling of citrus culture development in Iran citrus pole. *Bulgarian Journal of Agricultural Science, 25*(4), 677–684

Agricultural development, one of the important economic sections of the country, has always been given special considerations in the master plans of governments within that, citrus culture as an important subsection of the agricultural sector, plays a substantial role in the development of agriculture. Due to the lack of prophecy planning for citrus production, harvesting, post harvesting, and marketing process, citrus culture in the citrus pole of the country has not been developed as it was expected. Since the major livelihood of agricultural producers in Mazandaran is citrus production (due to the semi-Mediterranean climate) and this sub-sector has not been scrutinized properly to fulfill its developmental needs and requirements, this qualitative applying grounded theory research was conducted to develop citrus culture development model, based on human resource development indications and citrus culture extension education. This is true for the fundamental infrastructure of agricultural development in general. Snowball sampling method was implemented and 125 agricultural experts in charge, along with 306 citrus producers were interviewed in depth until theoretical saturation was satisfied. Grounded theory methodology consisting as open coding, axial coding and selective coding applied in this study. Results showed that major factors as structural, economic, social, environmental, technical, cultural-educational and individual features with its components play significant roles in citrus culture development in Mazandaran.

Keywords: agriculture development; citrus culture; development; economic components; environmental components

Introduction

Citrus, as major horticultural crop significantly contribute in earning and providing farmer's livelihood in Iran. Nowadays, citrus culture is tremendously important in the world. In addition to its high nutritional value, its economic importance is a main reason for its wide production in producing countries. The big size and lack of proper orchard management of citrus cultivation farms are the main reasons of partial loss of benefit in agriculture of many developing countries (Dorji et al., 2016).

According to the FAO report, Iran is considered one of the top ten producers of citrus in the world. Mazandaran province, in northern part of Iran, is an advanced region in the production of citrus crops, with over one hundred thousand individuals' household occupation (Hosseini & Rafiei, 2007). From a historical standpoint, agricultural development is not just converting static agriculture to a dynamic and innovative agriculture, but it is bringing up expedition of the agriculture growth that raises economy. Hence, an agricultural development theory should consider a view of the process of agricultural growth, factors and its components in combination with social and stability applications (Kalantari, 2012).

Jiang et al. (2010) has designed and evaluated a theoretical model of organizing citrus fruits. Based on the general perception of economic organizations structures this model has been formed on the basis of renovation, industrialization and marketization. In this model some indicators including production scale, management, farmers' motives and competition in the market have been involved. A cluster analysis of citrus fruit production in the Mazandaran province has shown its advantages, drawbacks, potential opportunities and threats (Ravanestan & Hashemi-Kamangar, 2012). Moreover, in aforementioned study, some strategies have been employed for increasing the utilization and optimization of resources and improving quality by industrialization and marketization. In another study, factors such as stabilizing the currency exchange rate, undesirable quality of products, transportation issues, office bureaucracy, production technology and cultural issues have been involved using structural equations and Friedman test (Doustar & Soltanifar, 2013).

In addition, Ahmadi et al. (2015) has concluded that training on citrus orchard management among farmers requires appropriate and timely implementation of management activities. There are positive correlations among variables such as age, education level, participation in training, promotional courses and educational requirement of producers, even though no significant relationship has been found between the variables of area under cultivation and farmer's history of training. Practical and field training in farm management have shown to be crucial to optimize yield and production and ultimately improve the conditions of farmers.

Duerden and Witt (2012) noted that while outcome evaluations have become the norm across most extension programs, attempts to find link between observed outcomes and program components often fail.

These results obtained in black-box outcome studies where program outputs are examined without examining internal operations and processes (Mowbray et al., 2003; Muñoz, 2005; Patton, 2008).

Based on the patterns and strategies of agriculture in each country, the adoption of any decision to apply the theory or development of mere model is ineffective and requires the use of systematic views in the rural development and agricultural process. Therefore, the objective of this study was to determine the adequate requirements for presenting a suitable conceptual pattern to improve the quality and quantity in citrus production process, marketing, and processing in the major citrus production area in Iran.

Materials and Methods

Generally, qualitative research methodology in natural environment study includes three sections:

- generalization – seeking to understand phenomena in their entirety, in order to have a thorough knowledge about understanding of the individual program, or specific position;
- deduction data;
- exploratory approach.

Exploratory approach

This study was performed in northern part of Iran (Mazandaran province), located between 35°47′ to 36°35′N, and 50°34′ to 54°10′E. The region consists of 128242 ha of citrus farms, which covers 47% of Iran's citrus production using the qualitative paradigm and Grounded theory (Marshall & Rossman, 2016).

Snowball sampling method was employed and 125 agricultural experts in charge along with 306 citrus producers were intensively interviewed until theoretical saturation was satisfied. For data acquisition, in-depth interviews, direct observation, preparing photographs, videos, libraries and internet documents were used. The validity of this study was confirmed via interviews with citrus producers and local experts.

Snowball sampling protocol

Step one – initial studies

Specialized texts and research questions were reviewed and formulated so that attempts were concentrated on the research objectives and dispersions were limited, as well as external validity that was strengthened.

Step two – selecting general issues of the study

Attempts were focused on cases that were theoretically beneficial. With the initial studies and examinations performed in this study, the general question of the study was compiled as follows: "What are the requirements and factors that affect citrus culture development?" The Scope of research and the statistical society for the study were selected – so, the scope of this research was Mazandaran, and the statistical population consisted of the rural citrus producers in the province of Mazandaran and experts from Jahad Agriculture and other subsidiary units.

Step three – compiling the instructions for gathering data

In addition to using in-depth interviews, direct and non-participatory observations, note-making and group discussions, methods such as preparing photos and videos, library and internet documents were used as complementary approaches.

Step four – entering the field

Data gathering and analysis were performed simultaneously. This allowed the opportunity to review and correct the data as they were generated (Papzan & Afsharzadeh, 2011).

Step five – implementing the data and attaching field notes to them

In this stage, the raw data, handy writings, field notes, and image were analyzed and studied comprehensively, and a general overview of the information and data was formed. Data recording was performed by creating and expanding concepts, levels, and attachments, as a repeatable process.

Step six – initializing the analysis process

Using open, axial and selective coding, concepts, issues, and matters were compiled, connections were made between an issue and its extensions, as well as issues were combined to form a theoretical framework.

Step seven – theoretical sampling

Through the theoretical sampling, data were simultaneously gathered, coded, and analyzed to create a setting for theoretical saturation and the compilation of a theory.

Step eight – end of analysis and reaching theoretical saturation

Analyzing the data is the core of grounded theory. In this regard, creating concepts through the coding process is greatly important. Coding denotes the operation by which data were broken down and was analyzed, conceptualized, and reorganized in new forms. This is the most important process for creating a theory based on the data. Coding is assigning the closest concept to the smallest meaningful bit of any piece of data gathered. The data gathered during the stages of open, axial, and selective coding were categorized. In open coding each of the problems and difficulties mentioned in the samples was assigned a code, and all data were coded. Then, in axial coding, the similarities and differences of each of the concepts were obtained in open coding. Finally, in selective coding, a general classification for all the data was reached. Thus, the setting for creating a structured model for the difficulties and obstacles that face agricultural development in the province of Mazandaran was prepared.

Step nine – comparing the emerging theory with available concepts

The final result of the three stages of coding: open – reviews all data and set each code for each sentences (Danaiefard, 2005); axial – developed each class and divided into different subclasses, diagnosed their relationships after coding and compared, the clusters were matched together and created one class (Adib Hajbagheri et al., 2013); selective – classes were combined and provided the initial research frame (Francis et al., 2008), the data were analyzed, compilation and extraction of a model manifested what the researcher has been able to extract from the data. In this stage a conceptual model of the obstacles rooted in technical, environmental and socio-economic problems which agricultural development facing in the province of Mazandaran was formed.

The viewpoints of experts also confirmed the validity and credibility of the model. The final theory resulting from the study considered economic, social, technical, structural, cultural, educational, individual and environmental factors, systematically effective on citrus culture development.

Results and Discussions

Results

Open coding

The open coding field information gathered from the target population was analyzed using EEM (Extension Education Modeling**)** in order to obtain a field model named "Identifying the requirements of citrus rearing development in the province of Mazandaran". In parallel, using Fundamental analysis model, after open coding, field notes and data gathered were reviewed several times, also after extracting their main statements, similar and meaningful issues were recorded as codes. Overall, there were 59 issues and for each was assigned a code. The main and focal issues are indicated in the tables (Table 1 and Table 2).

Axial coding

In axial coding the classified forms were developed and divided in some subclasses and interrogatives for data comparison. The researcher compared coded data, converted it into appropriate clusters and placed similar codes in the same class (Adib Hajbagheri et al., 2013). In this stage the codes and initial classes that were formed during open coding were combined with similar items, relationships between detailed classes were specified, and then classes with new concepts were formed.

Selective coding

Selective coding was used to combine the created classes in order to form the initial framework of the research. In this stage, the statements that have previously been coded were recombined to better understanding of their relationships. Then the related diagram was drawn to show the intersection between the issues (Francis et al, 2008). Selective coding refers to the process of selecting a class as the main class and relating it to the other classes. The main idea was to create a story line around what surrounds all other issues (Fig. 1).

After examining and analyzing the gathered data, 59 final classes were obtained and were classified in the following main categories:

Table 1. Conceptualization of the research data by open coding

Item	Concept
1	2
1	Sorting expenses
2	Packaging expense
3	Determination of a guaranteed price by the government
4	Marketing expenses (Sales, transportation, …)
5	Exports to target countries (Middle East, Russia, Arab countries)
6	Net profit for the farmer
7	Providing the settings for new funding and investments
8	Low-interest loans and bank credit
9	Assignment of direct assistances (inputs such as fertilizers, seeds, …)
10	Middlemen – Purchasing the product from the producer and delivering it to the market
11	Joining to the global market
12	Using new varieties
13	Using drip irrigation system
14	Using new mechanization techniques
15	Creating storage facilities
16	Creating refrigerating
17	Creating sorting facilities
18	Creating conversion and processing industries
19	Reducing waste (Harvesting, storing, and transporting)
20	Harvest time
21	Planting pattern (Planting various citrus fruit based on local climate)
22	Agronomic practices (pruning, plowing, ...)
23	Creating agricultural formations (Unions, …)
24	Entrepreneurship and creating new jobs
25	Welfare and raising the farmers' standard of living
26	Creating psychological assurance margin using farm insurance
27	Changing consumption pattern (dried fruit, …)
28	Participating in new systems of production and supply
29	Controlling pests and plant diseases
30	Managing the consumption of fertilizers and pesticides
31	Ensuring the health of imported commercial varieties
32	Ensuring the health and safety of the product
33	Optimal management of water consumption
34	Protecting biological variations
35	Combined battle against pests
36	Producing organic products
37	Governmental policies for supporting citrus fruit growers
38	Parliament laws for supporting citrus fruit growers
39	Number and size of farm lands
40	Official bureaucratic system
41	Existing organizational management structure
42	Technical infrastructures (Roads, Ports, Airports, Terminals, …)
43	Human resources structure (experts, supervisors)
44	Implementing environmental and hygienic policies regarding production and storage
45	Farmers' native knowledge
46	Farming experience
47	Using suitable technology
48	Using ipm-ffs training (in-farm training)
49	Performing research suiting users' needs
50	Using scientific innovations
51	Using new training methods (Computers, internet, …)
52	Farmers' age
53	Sex
54	Education level
55	Field of education
56	Farming being the main or a second occupation
57	History of farming activity
58	Marital status
59	Number of family members

• Personal and professional attributes of the farmers, including 8 items: age, sex, educational level, field of education, work history, primary/secondary occupation, marital status and number of family members.

• Social attributes, including 6 items such as: participation, membership in manufacturing cooperative, occupation, insurance, consumption pattern and production systems.

• Economic attributes, including 11 items: income, land ownership, the expanse of the farm, loans, export, added value, assistance programs, pricing, standardization, marketing, and production expense.

• Cultural-educational factors including 7 items: extension of experts through training the farmers, native knowledge, informing, technology, using international achievements, accepting technology and innovation.

• Environmental factors including 8 items: consuming fertilizers and pesticides, health of imported varieties, soil safeguarding, organic production, controlling pests and diseases, food health and safety, reduction of water consumption, and biological variation.

• Structural factors including 8 items as: development of human resources, planting pattern, directive indexes, government rights and policies, number of pieces of land, and technical infrastructures.

• Technical and production factors including 11 items: type of citrus fruit, yield (per unit area), conversion indus-

Table 2. Expanded and detailed classes detected by axial coding

Expanded classes	Number	Concepts (codes) – (detailed classes)
Economic factors	1	Sorting expenses
	2	Packaging expense
	3	Determination of a guaranteed price by the government
	4	Marketing expenses (Sales, transportation, …)
	5	Exports to target countries (Middle East, Russia, Arab countries)
	6	Net profit for the farmer
	7	Providing the settings for new funding and investments
	8	Low-interest loans and bank credit
	9	Assignment of direct assistances (inputs such as fertilizers, seeds, …)
	10	Middlemen – Purchasing the product from the producer and delivering it to the market
	11	Joining to the global market
Technical and production factors	1	Using new varieties
	2	Using drip irrigation system
	3	Using new mechanization techniques
	4	Creating storage facilities
	5	Creating refrigerating
	6	Creating sorting facilities
	7	Creating conversion and processing industries
	8	Reducing waste (Harvesting, storing, and transporting)
	9	Harvest time
	10	Planting pattern (Planting various citrus fruit based on local climate)
	11	Agronomic practices (pruning, plowing, ...)
Social factors	1	Creating agricultural formations (Unions, …)
	2	Entrepreneurship and creating new jobs
	3	Welfare and raising the farmers' standard of living
	4	Creating psychological assurance margin using farm insurance
	5	Changing consumption pattern (dried fruit, …)
	6	Participating in new systems of production and supply
Environmental factors	1	Controlling pests and plant diseases
	2	Managing the consumption of fertilizers and pesticides
	3	Ensuring the health of imported commercial varieties
	4	Ensuring the health and safety of the product
	5	Optimal management of water consumption
	6	Protecting biological variations
	7	Combined battle against pests
	8	Producing organic products
Structural factors	1	Governmental policies for supporting citrus fruit growers
	2	Parliament laws for supporting citrus fruit growers
	3	Number and size of farm lands
	4	Official bureaucratic system
	5	Existing organizational management structure
	6	Technical infrastructures (Roads, Ports, Airports, Terminals, …)
	7	Human resources structure (experts, supervisors)
	8	Implementing environmental and hygienic policies regarding production and storage

Table 2. Continued

Cultural-educational factors	1	Farmers' native knowledge
	2	Farming experience
	3	Using suitable technology
	4	Using ipm-ffs training (in-farm training)
	5	Performing research suiting users' needs
	6	Using scientific innovations
	7	Using new training methods (Computers, internet, …)
Personal factors	1	Farmers' age
	2	Sex
	3	Education level
	4	Field of education
	5	Farming being the main or a second occupation
	6	History of farming activity
	7	Marital status
	8	Number of family members

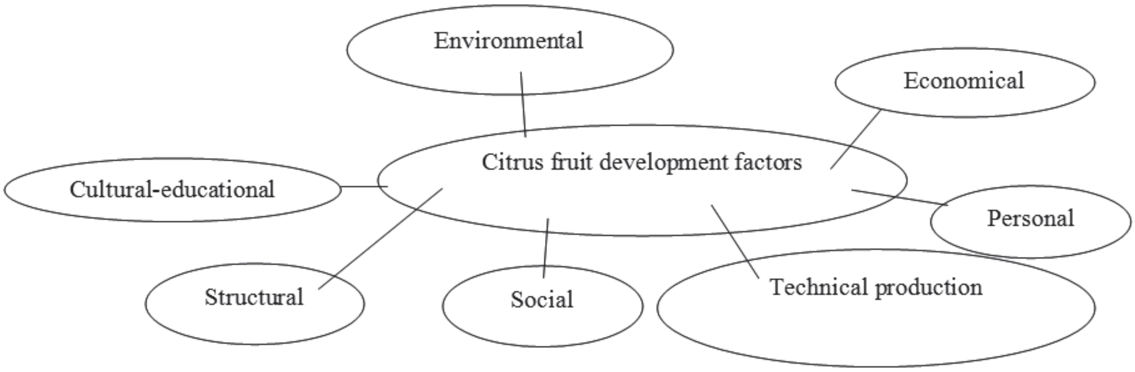

Fig. 1. Conceptual structure of the research

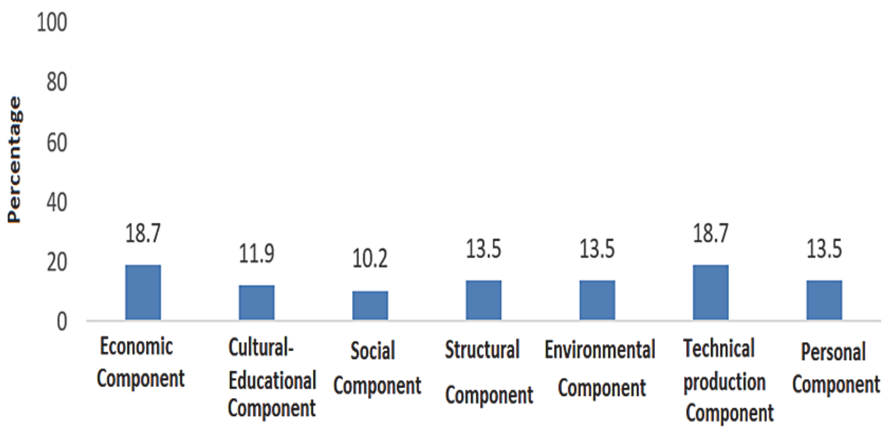

Fig. 2. Share of components in compiling the model

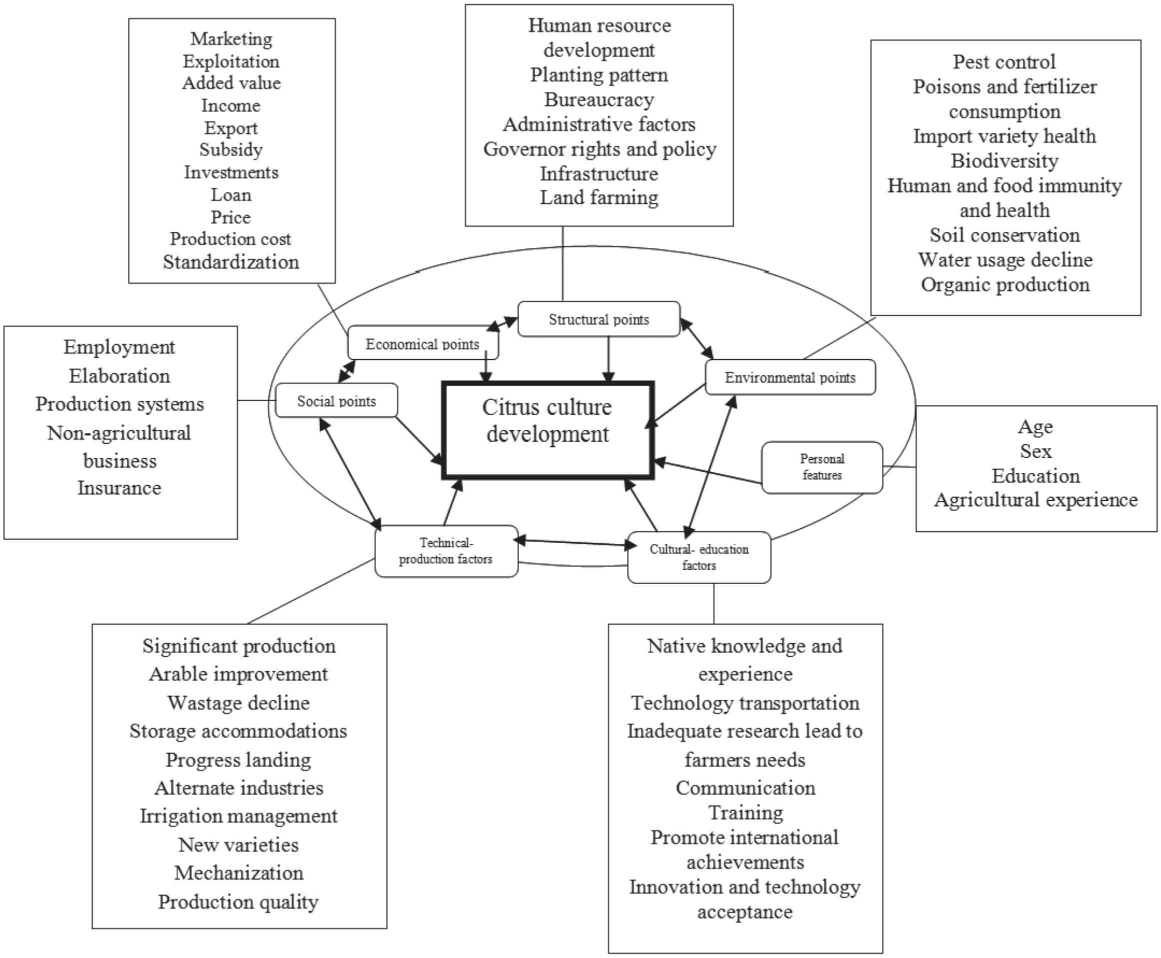

Fig. 3. Theoretical model of the research

tries, agronomics, reducing waste, storage facilities, improving land, water management, using new varieties mechanization and improving the quality of products food (Fig. 2 and Fig. 3).

This figure represents the percentage of share assigned to the components in compiling the conceptual model. This diagram indicates different contribution of components in compiling the conceptual model of citrus culture development in Mazandaran.

Discussion

As the model suggests, seven factors such as economic, social, structural, technological, environmental, cultural educations and personal features as systemic and conjunct model had significant effects on Mazandaran citrus culture development. These factors demonstrate that the citrus development has not only one point of view but also has complex protocol (via harmonious, balanced and structured interaction) demanding cooperation between all components of development. Significant yields of citrus production roots are from two sides. Firstly are environmental considerations to provide a healthy product. Domestic market and foreign market availability help to approached extended values in agriculture. On the other hand, education, professional employees, scientific technologies and innovations beside the government laws and executive principles probably improved the citrus culture in the capital of this fruit in Iran.

Attention to several answers and their abundance in this survey in different ways of classifying detected that education and age in personal features, reduce the production cost, marketing and government purchases price from economical area, insurance and productive cooperation among social aspect, major management of water, waste reduction, in technological aspect processing and alternate industries, optimal management of manure and poison utilities from pest and disease control, provide an organic production as well as environmental point, human resource developing, technical infrastructure (via routs, ports), government policy and rights among the structural view, then transport the scientific and novel technology achievements from the cultural-educated point will have major efficiency to provide the citrus culture development in this province.

Conclusions

Results of this study illustrate some suggestions to remove the obstacles in this topic as:

- Use the origin technological knowledge to provide the significant yield at planting level.
- Obvious suitable planting pattern base on technical capacity of different citrus planting in Mazandaran.
- Optimal environmental management led to decrease of fertilizer and poison consuming, soil and water resource conservation and provide the healthy products as well.
- Strengthen the technical infrastructures such as sorting, cooling and delivering accommodations and facilities to the target markets.
- In order to produce knowledge, keeping and products delivering to market, beneficiaries training is necessary.
- Create the condition to extend the agriculture insurance.
- Beside the producers supervising, provide an approval rules and supportive policies such as guaranteed purchases, reduce portion loans and give production subsidy.

Acknowledgements

Hereby, we sincerely express our gratitude to all those who assisted us in this study.

References

Adib-Hajbagheri, M., Parvizi, S., & Salsali, M. (2013). Qualitative Research Methods. Nashr Va Tabligh Bashari Publication, 290.

Agriculture Statistical Letter. (2013). Eliminate agriculture organization. Mazandaran province.

Ahmadi, G. H. (2015). Study on educational demands of orange and citrus producers in Mazandaran province, Iran. In: *Final Reports on Scientific Education and Agriculture Organization*, 35.

Arbaeen, R., Zarafshani, K., Mirakzadeh, A. A., & Arkouazie, K. (2013). Compilation of conceptual model of participation of operators in the development of gardens in natural resources (Case study: ALAHYAR Khani Village, Kermanshah County). MSC Thesis, Natural Resources and Agriculture College, Razi University.

Ardestani, M. (2014). Citrus marketing analysis from the world and Iran. Jihad Agriculture Ministry, Agricultural Planning, Economic and Rural Development Research Institute.

Clemente, F., Lírio, V. S., & Maciel Gomes, M. F. (2015). Technical efficiency in Brazilian citrus production. *Bio-based and Applied Economics Journal*, *4*(1050-2016-85713), 165-178.

Danaiefard, H. (2005). Using the detective approach on theorization in conceptual strategy of fundamental theory. Daneshvar raftar. *Bi-Monthly Scientific Journal*, *12*, 57-71.

Dorji, K., Lakey, L., Chophel, S., Dorji, S. D., & Tamang, B. (2016). Adoption of improved citrus orchard management practices: a micro study from Drujegang growers, Dagana, Bhutan. *Agriculture & Food Security*, *5*(1), 3-5.

Doustar, M. A., & Soltanifar, A. (2013). Determining the agriculture expert blocks and display the strategies of agricultural products development. In: *National Conference of Powerful Management in Iran Economy, Rasht, Iran,* 1-16.

Duerden, M. D., & Witt, P. A. (2012). Assessing program implementation: What it is, why it‘s important, and how to do it. *Journal of Extension*, *50*(1), 1-8.

Francis, K., Mills, J., & Bonner, A. (2008). Getting to know a stranger – rural nurses' experiences of mentoring: a grounded theory. *International Journal of Nursing Studies*, *45*, 599-607.

Hosseini, S., & Rafiee, H. (2007). Market behavior of citrus in Mazandaran province. *Agricultural Economics*, *2,* 92-73.

Jiang, Y. K., & He, Q. (2010). Construction and evaluation of the theoretical model of citrus cooperative organization. *Asian Agricultural Research*, *2*(1812-2016-143054), 44-47.

Kalantari, K. H., & Nematolalhi Safaieean, S. (2013). Planning and local development. Ch. 4. Territorial analyzed technic. Khoshbin Publication.

Khalili, M., & Shokat Fadaee, M. (2011). Agricultural policies: Review of the relationship between facilities and agriculture. PNU Publication.

Marshall, C., & Rossman, G. B. (2016). Designing qualitative research. SAGE Publication.

Mowbray, C. T., Holter, M. C., Teague, G. B., & Bybee, D. (2003). Fidelity criteria: Development, measurement, and validation. *American Journal of Evaluation*, *24*(3), 315-340.

Muñoz, M. (2005). Black box. In: *S. Mathison (Ed.), Encyclopedia of evaluation*. SAGE Publication, Thousand Oaks, Canada, 34-35.

Papzan, A. H., & Afsharzadeh, N. (2011). Study on native mechanism of management in Zabol Meadow migratory clans. *Seasonal Scientific Journal of Iran Meadow and Desert Research*, *17,* 477-478.

Patton, M. Q. (2008). Utilization-focused evaluation. SAGE Publication, Thousand Oaks, Canada.

Ravanestan, K., & Hashemi Kamangar, S. M. (2012). Strategic analysis of Mazandaran citrus cluster within SWOT method. In: *National Conference of Business and Business Knowledge Management, Babolsar, Iran,* 1-12.

Received: May, 23, 2018; *Accepted:* August, 2, 2018; *Published:* August, 31, 2019