

Improvement of Competitiveness: The Case of Iranian Pistachio

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The purpose of this research is to investigate which factors can play a role to improve Iranian pistachio competitiveness in global market. In previous decades, Iran was the main producer and exporter of pistachio in the world. Recently, Iranians face a reduction in market share and sales due to poor quality and fierce foreign competition. In the perspective of competitiveness, 5 hypotheses based on international standard, pistachio contamination, Domestic demand condition, vertical integration and instable political and economical policies were elaborated. To test hypotheses structural equation modeling (SEM) with Amos software used. Data output showed that while international standard and pistachio contamination have the greatest impact on improvement of Iranian pistachio competitiveness in global market, domestic demand condition has the least among others. Moreover, for all five indices, their sub-factors to estimate their co-efficiencies with Amos graphics illustrated. Finally, study found that stable exchange rate policies, making appropriate packaging strategy, applying adequate standard and applying modern methods to prevent pistachio contamination would be crucial to gain more market shares. Model results show it's goodness-of-fit. $AGFI=0.92 \cdot GFI=0.97 \cdot RMSEA=0.04$ and $\chi^2/df=1.95$

JEL Codes: L21, M16, M21

1. Introduction

Iran is a country where 50% of the economy is centrally planned. Pistachio industry is one of the most important non-petroleum industries for Iranian economy. Pistachio which is so-called green gold is the largest among non-petroleum export industries.

According to FAO statistical database in 2005, Iran, USA and Syria have the largest pistachio productive area. Accounting for 66% of global area devoted to pistachio for Iran and 9% for USA and 10% for Syria, but the first two producers are Iran with 40% of the global total and the second USA with 27% of the global total (Aghdaie 2009).

Although Iran is the biggest exporter around the world thanks to 40% production of the world's pistachio and having 60.7% of the whole world's market (FAO 2006), still couldn't compete with its powerful competitors who have advanced technologies and only involved in various challenges such as lacking producers who can use modern methods in producing, packaging, exporting. Developing and even keeping shares in

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Zomorodi

the world's market can cause to increase the inland production motivation, investing and making more job opportunities.

During the last decade, it has been a question for Iranian firms that how they can escape from such a crucial condition and changing threats like price and International Standards to opportunities, to create competitive advantage in price and quality domestically and also remains competitive in international markets. As a result, according to the position of Iran in the past and current situation, investigating and identifying factors that can help Iranian pistachio firms to re-capture their market shares and improve their competitiveness in global market seems to be very essential. Iranian pistachio producers aim to further improve their international competitiveness by using new technical and marketing strategies.

The purpose of this research project is to make an improvement of competitiveness model for Iranian pistachio based on internal and external factors by answering five critical questions.

1-Which kinds and to what extend International Standards is the most appropriate one to implement pistachio's cultivation and preparation? 2-To what extend and which kinds of pistachio contamination can have positive impact on Iranian pistachio growers to compete with foreign competitors? 3-What kinds of packaging strategy can help Iranian to penetrate and sale better in global market? 4-What kinds of political and economical instability cause the most damages to Iranian pistachio exporters? 5-To what extend domestic demand condition can help Iranian to improve their competitiveness?

This study organized as follows. First, providing a brief review of pistachio improvement factors as a research context and examining the Iranian pistachio industry. Next section describes five hypotheses regarding how Iranian firms can improve their competitiveness in global market. Using a sample of 30 firms which are listed in Iran Pistachio Association and Bazar of Tehran intermediaries in the year 2010, hypotheses are tested. Following that results, study limitations, and direction for future research are discussed.

2. Literature Review

During the last decade, especially because of political sanction and pressures, access to financial resources in Iran has been very difficult and time-consuming. Financial institutions in Iran are mostly governmental based. In contrast, foreign pistachio stakeholders have easy access to low interest loans. Previous studying revealed that Iranian pistachio producers had no intention of investing in the development of their workforce. So, it is very difficult to find employees with the required skills to work in the sector. Generally, decision makers within a farm could have different levels of education. (Homayounfar 2008).

As a result it has been revealed that Iranian pistachio firms have followed two different strategies. The firms exporting to China, Russia, and similar markets claimed to have pursued a cost leadership strategy. This group is mainly integrated by less educated farmers who own the small-scale farms and represent 60% of total pistachio production. The other group, integrated by big farm owners, exporting to the EU and

Zomorodi

more demanding markets that are willing to pay a premium price, claimed to have pursued a differentiation strategy, emphasizing quality and service (Dr. Federico 2011).

The pistachio industry in Iran is facing some difficult challenges to improve their productivity and efficiency. Although, Iran continues to be the biggest producer and exporter of pistachios in the world, it has the lowest productivity yield per hectare compared to production efficiency levels achieved by other countries. Iran has increased the total area for pistachio production over the past years but the production efficiency has not improved (Vardan 2003).

Several studies have focused on the comparative advantages of Iranian pistachios. A latest research shows that for retaining comparative advantage in pistachio production, productivity and production costs must be both increased and decreased, respectively. In order to increase the productivity of pistachio, farmers should use scientific on-farm management and should employ modern production methods, and government should develop research and development institutes (Amirteimoori 2008). Several aspects of improvements in pistachio industry were discussed separately by scholars. Shahnoushi and Saghaian (2007) concerned impact of food safety on Iran's pistachio export demand to European countries, Japan and Australia for the period of 1997-2006 ; Empirical results of their studies indicate that food safety shocks have a statistically significant negative impact on the import demands of those countries. Base on the results, Iran needs to have a more certain and clearer planning in production, marketing, and more importantly observation of health principles in order to maintain its export market shares in the world.

Moreover, Seyed fathollah Amiri Aghdaie(2009) investigated effective factors in pistachio exportation. Results of his investigation shows that the principles of exporting, aflatoxin poison and packaging have great influence in exporting Iran's pistachio; Effect of exchange rate fluctuation on international trade flows by studying case of Iranian pistachio exports in the period of 1978 to 2008 was studied by Mostafa Goudarzi in 2012. The results of his studying show that exchange rate volatility has had positive and insignificant effect on exports of pistachio. So, Iran's agricultural trade policies toward different countries should be developed based on exchange rate fluctuations (Goudarzi 2012).

My study makes two valuable contributions to this literature. First, to the best of my knowledge, no study to date has investigated maximum effects to evaluate their strength of co-efficiencies on pistachio improvement of competitiveness in an instant. Unlike these studies, which may ignore other important dimensions and create omitted variable problems, I used a large set of success variables, both internal and external ones. Moreover, this research has tried to give more sub-factors to make more understandable and comprehensive model. Therefore, the results in this study provide a comprehensive understanding of pistachio competitive industry.

Zomorodi

2.1 Hypothesis Development

2.1.1 International Standard and Competition

As international competition occurs intensively in pistachio, global market members search and pursue different and modern approaches, technologies and knowledge to create competitive advantage and use opportunities which is generated or existed in home or host countries to gain much more profits. There is no denying that International Standards are the kinds of Product and Testing management certifications which are categorized as Nontariff Barriers which are the kinds of governmental supervisions on international trade. Any government regulations, policy, or procedure other than a tariff that has effect of impeding international trade may be labeled a nontariff barrier (NTB) (Ricky W. Griffin 2008). The International Organization for Standardization (ISO) has been working to develop and refine an international set of quality guidelines (Ricky W. Griffin, International Business: A Managerial Perspective 2008). ISO 9000 is a kind of standards which is applied for quality management systems. ISO 31000 is a kind which applies to provide principles and generic guidelines on risk management. ISO 22000 is a kind of standards which is applied for food safety. ISO 22005 is a kind standard which is applied for traceability in the feed and food chain. Hazard Analysis Critical Control Point or HACCP is a systematic preventive approach to food safety and pharmaceutical safety that addresses physical, chemical, and biological hazards as a means of prevention rather than finished product inspection. Hence, the first hypothesis of this study suggests:

H1: Familiarity with international standards is crucial for improvement of pistachio competitiveness in global market

2.1.2 Contamination in Pistachio

2.1.2.1 Salmonella Contamination

Salmonella that contaminates food, including dry fruits such as pistachio can cause human disease and represent almost 3% of the disease that really happen. The U.S. Food and Drug Administration (FDA) said several illnesses had been reported that maybe associated with the contaminated (REUTERS 2009). Salmonellosis is an infection with the bacteria Salmonella (Centers for Disease Control and prevention) 2009). Most people become sick by consuming pistachios contaminated with the bacteria which results to get diarrhea, abdominal cramps and fever

2.1.2.2 Aflatoxin Contamination

Pistachios that are weakly protected by hulls are most sensitive to contamination in the orchard. Sometimes the hull is bind to the shell. Therefore it splits with the shell, uncovering the kernel to moulds and insects invasion which is known as early splitting. Although the importance of early splitting for mould, aflatoxin and insect contamination is well settled, very little is known interesting when early splitting happen and get contaminated. Early split pistachios which are not contaminated in the garden may get contamination during distribution and handling. High humidity and temperature within mass boxes provide ideal conditions for the contamination of early split pistachios, which dramatically intensify the occurrence level of aflatoxin

Zomorodi

contamination. It is worth noting that until pistachios are mycological stabilized by drying or freezing, Aflatoxin contamination is certainly a critical problem for many pistachio producing nations.

The European Union's 1997 embargo on pistachio imports from Iran due to high levels of aflatoxin in some shipments illustrate the seriousness of this problem. Hence, the second hypothesis suggests that:

H2: Familiarity with pistachio contamination is effective on improvement of competitiveness

2.1.3 Vertical Integration in Pistachio Industry

Because production of most manufactured goods needs different kinds of raw materials, parts, and other resources, the first problem an enterprise production manager confronts is to decide how to obtain those inputs. The first step to extend a supply chain management strategy is to set the suitable degree of vertical integration. Vertical Integration is the extent to which a firm either provides its own resources or obtains them from other sources (Ricky W. Griffin 2008). It is worth noting that packaging can be crucial part in this area. Iranian exporters point out many countries prefer to process and package pistachio in their own countries as part of their marketing strategy. (Koshteh 2005).

A product's package serves several functions, protecting, facilitating use of, and promoting the product, as well as providing information about the product and its use (Aghdaie 2009). The protection function is critical in both transport and storage, protecting a product under a variety of temperatures and moisture conditions.

Competition in pistachio's world market causes thinking over increasing quality of this crop; In fact one of the most basic and practical solutions to prevent wholesaling in exportation is to strengthen transforming and completing industries in the field of agriculture and exporting pistachio in the appropriate packages which causes selling pistachio in higher price. It is highly noted that there are 4 strategies to penetrate pistachio market in the context of packaging and marketing in global market:

- 1- Domestic packaging - Selling with Foreign Brand name
- 2- Domestic packaging - Selling with Domestic Brand name
- 3- Outsource packaging - Selling with Domestic Brand name
- 4- Outsource packaging - Selling with Foreign Brand name

Hence, the third hypothesis suggests that:

H3: Familiarity with packaging and branding as a crucial part in vertical integration can help Iranian to improve their competitiveness in global market

2.1.4 Instable Political- Economical policies

Iran's economy relies heavily on oil revenues. This revenue has been used to implement a range of policies. For instance, government subsidies - particularly on food and energy - have influenced the national economy for more than 30 years.

Zomorodi

Recently, Iranian government has decided to reduce subsidies (Majlis.ir 2010). The cut of subsidies has had dramatic effect on many Iranian industries. (Karimi 2008) Iran government has put tariff on imported agriculture machinery. This tariff would, according to the government, protect and help the development of the national industry. Domestic machinery is of inferior quality than imported one. However, many farmers purchase Iranian farming machinery because of its competitive price. This is the part where American and foreign rivals producers have a clear competitive advantage in development and management of irrigation systems. The access to more modern irrigation systems results in higher harvest and a more efficient and sustainable utilization of underground water resources (Koshteh 2005).

It is commonly accepted that the movements of the real exchange rate have a significant effect on exports and imports. Most current micro-structural and theoretical models of exporter behavior predict a negative relationship between exchange rate risk and volumes of trade, reflected in the conditional variance of exchange rate and export volumes. The increase in exchange rate volatility is widely believed to have detrimental effects on international trade and thus has a negative economic impact (Komeil Khanarineja 2012). Exchange rate volatility and misalignment in Iran are recognized as two major limits on export promotion during last three decades. These occurred primarily due to some breaks like Iraq imposed war against Iran and the U.S sanction which brought serious problem for economy. Hence the fourth hypothesis suggests that:

H4: Instable Political and economical policies can have negative impact on Iranian pistachio competitiveness in global market

2.1.5 Domestic Demand Condition

In 2010, 20% of the total Iranian pistachio production was consumed in the domestic market (Iranian pistachio association, 2010); Even though the largest proportion of pistachio is consumed in international markets. Iranian domestic demand conditions have not supported the Iranian pistachio industry to develop competitive advantages. While most Iranian and western consumers have different preferences and different attitudes to pistachio products, CIS and middle east countries thanks to various similarities, seem to have same attitude to it. Iranian consumers are concerned about the physical characteristics of pistachios and not very much interested in food safety standards. So, domestic consumers are not a valid point of reference for Iranian firms to anticipate the need of consumers in western industrialized countries such as EU and America (BorhanZadeh 2011). Hence, the fifth hypothesis suggest that

H5: Domestic demand conditions has impact on improvement of pistachio competitiveness in global market

3. The Methodology and Model

The research setting of this research was in Iran. In order to test my hypothesis, I have conducted an empirical study. So, target population for Self Administered research was Bazaar of Tehran pistachio intermediaries and 30 firms which are member of Iranian pistachio association mainly focused on two provinces –Kerman and Tehran, in the year 2010. The sampling method which used in research paper

Zomorodi

was non-probability, restricted purposive sampling. The sample size was determined by following approach;

Expected Interval estimate of Population Proportion = ± 10

$Z = 1.96$ (Confident level of 95%), $\sigma_p = \pm 0.1Z = \pm 0.11.96 = 0.051$ Standard error of the proportion (Donald R. Cooper 2008) $pq = 0.5*0.5 = 0.25$ Sample Dispersal Measure; assumed high values to be included, $n =$ sample size (Donald R. Cooper 2008), $\sigma_p = pqn \square 0.051 = 0.25n \square n = 96$

So, 200 questionnaires which sent in two stages by my own, email and fax and finally 123 responses were selected.

To designs this questionnaire, content validity was mentioned. Content validity refers to the extent to which a measure represents all facts of our model. So, to consider this issue, Individual Depth Interview (IDI) has been done with twenty selected university professors, pistachio producers, managers and researchers. The type of interview was unstructured. Their opinions were asked to design the initial structure of questionnaire. In this stage, the main focus was on the content of all factors which were elaborated. So, in the first stage of editing and measuring validity of questionnaire, content validity was used by SPSS software. The questionnaire was consisted of 35 questions which measured five main factors with their subsets: International standard, instable Political and economical policies, vertical integration, pistachio contamination and domestic demand condition.

In this research instable political and economical policies (instable P &E policies) was divided to cutting governmental subsidies, putting tariff on imported machinery and exchange rate volatility(Exh-Vol) .Domestic demand condition (Dc) is evaluated in the perspective of food safety and shape. In the area of vertical integration (ve-int) packaging as crucial part of marketing was categorized into

- 1- Domestic packaging - Selling with Foreign Brand name (Dp-Sfb)
- 2- Domestic packaging - Selling with Domestic Brand name (Dp-Sdb)
- 3- Outsource packaging - Selling with Domestic Brand name (Op-Sdb)
- 4- Outsource packaging - Selling with Foreign Brand name (Op-Sfb)

Pistachio contamination is considered as two important factors: Aflatoxin and Salmonella Contamination and finally, international standard is divided to 5 sub-groups which are: HACCP ,ISO22005 ,ISO22000 ,ISO9000 ,ISO31000.

Type of measurement scales which used in survey were ranking (choice) scale, multidimensional, both balanced and unbalanced and finally unforced scales. Also, multiple choice, and Likert scale have been used.

In order to measure reliability of questionnaire two methods were used. Alpha Cranach which was 0.8354 and $(X^2/df)^4$ which uses in structural Equation modeling. Finally, presenting model of improvement and justifying hypothesis were done by Amos software.

The essential data have been gathered from library resource like books, scientific journals and internet base resources like internet gateways, online services, FAO (Food and Agriculture Organization) database, published documents, reports of prior

Zomorodi

research studies and organization's own data archive. The type of research is quantitative research.

T refers to statistic data; in case that Sig (meaningful level) is less than 0.05 hypotheses were accepted

4. The Findings

By applying factor analysis technique, 33 variables based on improvement of competitiveness were selected. In fact, by using exploratory factor analysis, variables relationships were recognized. Data output of this part were usable in structural equation modeling. Firstly, analysis was done by SPSS and the second analysis was done with Amos. In this stage, confirmatory factor analysis was mainly focused. Based on structural equation modeling, factors would be accepted or rejected. Considering that five key areas are equivalent of one measuring model in structural equation modeling literature, factor analysis was done for each area separately. Data output based on 123 questionnaires is shown in table 1

Table 1: Factor analysis on questionnaires

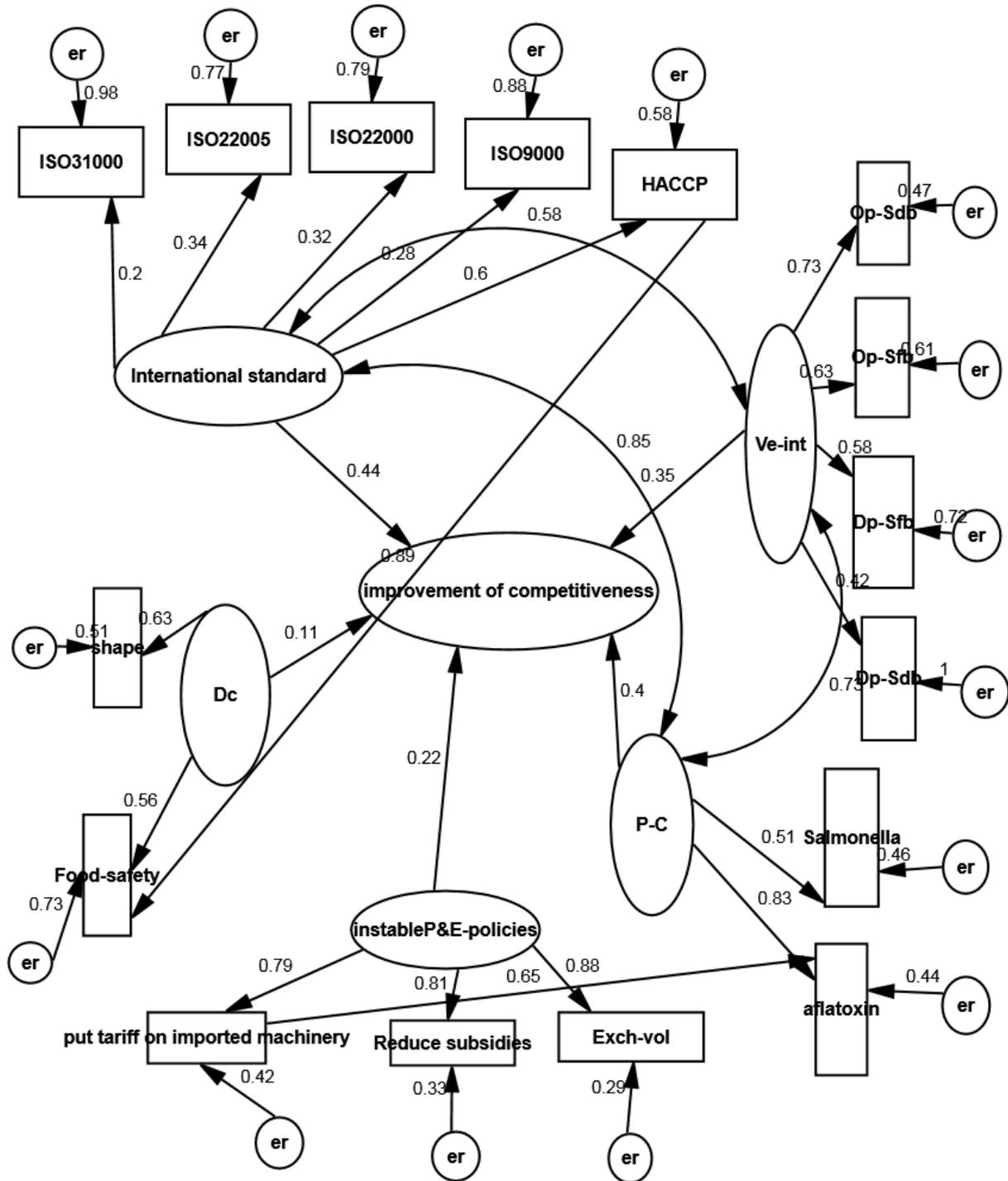
<i>International standard- pistachio contamination and vertical integration</i>	Domestic demand condition	<i>Instable Political and economical policies</i>	
12	6	15	<i>Variable numbers</i>
<i>3 times</i>	<i>once</i>	<i>3 times</i>	<i>Factor analysis repetitions</i>
0.830	0.763	0.719	<i>KMO test</i>
0.000	0.000	0.000	<i>Bartlett test</i>
≥ 0.564 <i>all</i>	≥ 0.551 <i>all</i>	≥ 0.591 <i>all</i>	<i>Number of common factors</i>
68.659	60.645	72.779	<i>Total variance explained (%)</i>
0.409	0.668	0.562	<i>Average load factor in the rotated factor matrix</i>

KMO test shows sampling quality. When result is more than 0.6 then factor analysis could be done. Moreover, significance level of Bartlett test should be less than 0.05.

Number of common factors table shows how appropriate questions are. This number should be at least 0.5. Finally, model of improvement of competitiveness for Iranian pistachio was illustrated to answer all research questions.

Zomorrodi

Figure 1: Structural modeling for Improvement of competitiveness



According to figure 1, vertical integration, international standard and pistachio contamination are highly related to each other. It shows role of sanitation not only in production but also in packaging and selling pistachio products.

Zomorodi

While International standard has greatest importance among 4 other indices on improvement of competitiveness (regression weight=0.44), HACCP has the most significance in the field of international standard (regression weight =0.6).

In the case of vertical integration, outsource packaging -selling with domestic brand got the highest regression weight (0.73) in packaging and marketing strategy for Iranian improvement of competitiveness. This result shows poor quality domestic packaging has been one of the reasons to lose global market shares. Moreover, results contend that Aflatoxin contamination is highly important when caring sanitation in pistachio industry.

In the field of instable political and economical policies all 3 subsets relatively got the same numbers which shows their quit importance, though, controlling exchange volatility by central bank of Iran seems more important for pistachio producers than two other factors to improve their competitiveness in global market(Regression weight=0.88).

Domestic demand conditions got the least importance in this model with the regression weight of 0.11. But for Iranian pistachio competitors shape is a bit more important than safety, though their regression weights are quite close in the year 2010. This is the fact that why Iranian pistachio producers are looking for new culturally similar markets such as middle-east.

4.1 Structural Equation Modeling to Justify Recommended Model

Six confirmatory factor analyses were done by Amos software. The first five were based on five main indices subsets and the last one was the model fit of improvement of competitiveness based on 5 main factors (International standard, pistachio contamination, vertical integration, instable political and economical policies and domestic demands). Results are shown in table 2

Zomorodi

Table 2: Structural Equation summary

<i>Model fit</i>	<i>Pistachio contamination</i>	<i>Vertical integration</i>	<i>Instable Political and economical policies</i>	<i>Domestic demand condition</i>	<i>International Standard</i>	<i>Tests</i>
1.95 <3	2.31 <3	2.36 <3	2.43 <3	2.98 <3	2.27 <3	χ^2/df
0.065	0.075	0.078	0.08	0.09	0.072	RMSEA
0.97	0.97	0.96	0.94	0.91	0.98	GFI
0.92	0.91	0.9	0.89	0.93	0.93	AGFI
0.04	0.04	0.04	0.042	0.047	0.039	RMR
0.00099	0.0000	0.0001	0.00048	0.03581	0.0000	P-Value
<i>Between -1.96 and 1.96</i>	<i>Between -1.96 and 1.96</i>	<i>Between -1.96 and 1.96</i>	<i>Between -1.96 and 1.96</i>	<i>Between -1.96 and 1.96</i>	<i>Between -1.96 and 1.96</i>	<i>T-student</i>

χ^2/df Shows whether the model describes the structural relationship among variables or not; this number should be less than 3. As this number is 1.95, it clearly shows that relations among variable were defined well.

GFI and AGFI indices show goodness-of-fit of model. AGFI shows model fitness according to degree of freedom and number of sampling. These two indices numbers should vibrate between 0 and 1. According to these results, all data have been evaluated on the significant level. RMR is an indicator which shows the average of differences between data and co-variance and variance data. As this scale gets smaller it would be better for goodness of model. As a result, based on these 3 indices numbers (0.97, 0.92., 0.04), goodness –of-fit for this model is good but it needs to cover more variables with more precise sub-factors to increase its strength.

Finally, according to table 2, all 5 hypotheses were supported (p-value <0.05). While international standard and pistachio contaminations are highly related to improvement of competitiveness (H1 and H2), domestic demands has the least impact on Iranian penetration into global market (H5).

5. Summary and Conclusions

Key factors to improve competitiveness in pistachio market were classified in two categories; production and trade. Challenges in production which were considered such as Aflatoxin contamination are only controlled by correct and efficient operation management and applying modern knowledge and technologies. Results of investigation shows majority of Iranian pistachio producers don't know about pest and sometimes even have not heard its name while aflatoxin poison is one of the most important factors to improve competitiveness in global market. As it is shown in

Zomorodi

structural modeling, Hazard Analysis and Critical Control Point (HACCP) method to prevent contamination during the harvest and postharvest stages plays a highest role in international standard. This will not be feasible without suitable training of all supply chain members such as cultivators, processors, warehouse staffs, traders and distributors.

Challenges in trade contain countries economical and political conditions and nontrade barriers which may facilitate or restricts the international trades. As Iranian government has put high tariff on imported agriculture machinery, it is kind of difficult barrier and obstacles for pistachio producers to attain cutting-edge technologies to compete with foreign competitors. As a result, food safety has substituted with just shape and taste. So, new markets such as UAE and Turkey which culturally are similar to Iranian market have found.

There is no denying that after intense sanctions on Iran and financial crisis in 2008, governmental support can help companies to stand in the market. Central bank of Iran has not made decisive decision to control exchange rate over last few years. So, many Iranian exporters have damaged and quit the market. As a result, paying great deal of attention on governmental and economical policies could help Iranian to re-enter European and American market.

It is highly noted that Iranian pistachio producers should care a lot to marketing and packaging strategy. Nowadays, today's world doesn't accept traditional method in marketing and packaging. Creating new idea and giving more information regarding products with beautiful and suitable package, would be beneficial to attract more foreign customers. As clarified four marketing strategy in this paper, outsourcing packaging and selling with domestic brand seems to be a convenient method for branding strategy and penetrating foreign markets.

Therefore having a good, correct and proper programming for supervisors, training and educating the producers, exporters and making them familiar with modern and update knowledge, Combat with pests and decrease aflatoxin in pistachio, having effective marketing and packaging strategy, enacting economical and governmental policies in a line with pistachio producers patronage are key factors which can help Iranian to develop and improve their competitiveness in global market.

6. Limitation and Future Research

This study has several limitations that should be considered for future research. As Travelling and accessing various firms around Iran was time and cost consuming, this study was cross sectional research which covered multiple of firms in one year. It is highly suggested that running regressions in panel data techniques in different years and fixing firm's and time effect would be more beneficial to get more precise understanding of this model. Besides, Improvement of competitiveness is a wide topic, so for future research, this topic should be specified and studied as a dependent variable in one concept such as exportation, percentage of market shares or sustainability in foreign markets. In addition, other key factors such as distance which can be applied in gravity model, economic situation of imported countries both can have significant impact on improvement of Iranian pistachio in foreign markets would be interesting for proceeding studies.

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Zomorodi

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