Strengths, weaknesses, opportunities, and threats in the Iranian pistachio industry

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Abstract

Introduction: SWOT analysis is one of the strategic tools for corresponding internal strengths and weaknesses to external opportunities and threats. According to this model, an appropriate strategy maximizes strengths and opportunities and minimizes weaknesses and threats.
Materials and Methods: The present study attempts to evaluate the strengths, weaknesses, opportunities, and threats in the Iranian pistachio industry.
Results: A group strategies have been extracted by analyzing the strengths, weaknesses, and threats in the Iranian pistachio industry and reviewing the strategies and policies of the base models. The strategies that have been extracted include: developing management and planning, developing advertisement and marketing systems, promoting knowledge and technology in the Iranian pistachio industry, attracting national and international support and sponsorship, increasing productivity, developing an efficient monitoring, evaluation and control system.
Conclusion: The evaluation of SWOT matrix indicated the weakness of internal factors and the large volume of health threats in Iranian pistachios. Moreover, the matrix has also reported that the optimal strategies should be defensive. In such conditions, a strategy is required to be adopted that, depending on the weaknesses, reduces or eliminates the damage caused by the threats ahead. To increase consumer awareness and health, a corrective approach is required to be adopted in the structure of the current health status of Iranian pistachios (especially for smallholders).

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1. Introduction

The origin of the term "SWOT" is unknown. SWOT analysis was described by Learned et al (1969) [1]. Since then, it has then grown as a key tool for addressing complex strategic conditions to improve decision making process. There is evidence that Albert Humphrey led a SWOT-based research project (Strengths, Weaknesses, Opportunities, Threats) in US companies in the 1960s and 1970s, but there is no scientific source supporting this claim [2]. Regardless of the exact historical validity for the creation of "SWOT", the term has been used in scientific sources for nearly half a century [3].

Through SWOT analysis, being one of the strategy formulation tools, strategies can be designed for different industries; strategies that are appropriate to their environment. Using this analysis, it is possible to not only analyze the internal and external environments but also make strategic decisions that creates the required balance between the strengths of the organization with environmental opportunities [4-7].

Pistachio is popular delicious nut from the Anacardiaceae family. Given its high economic value, pistachio is known as green gold. Pistachio is eaten as a nutrient; a fresh, roasted and salted snack. Pistachios are also used in cakes, sweets, biscuits, candies, ice cream, chocolate, pistachio butter, and sausages, and lunch meat [8].

Sadeghi et al (2013) reported that the most important SWOT factors affecting advertising in pistachio exports include "skilled and trained human resources in pistachio advertising and export across the province", "lack of a proper brand for the exporter", “Lack of proper budget allocation to advertising by exporters”, and "lack of financial facilities for advertising and marketing from export incentives, especially in specialized magazines". From among these factors, "skilled and trained human resources in pistachio advertising and export across the province" has the highest rank; it had the most significant effect on advertising for pistachio exports. Finally, by analyzing the research results, the following executive and practical recommendations were proposed for improving the advertising status of exported pistachios of Kerman; reducing the export of bulk pistachios; moving toward packaging based on international standards; and organizing and systematizing storage and transportation systems [9].

In a study, Borhanzadeh et al (2015) formulated Iranian pistachio export strategies and by using internal strengths and weaknesses, opportunities, and environmental threats, they argued that the fuzzy TOPSIS method was more appropriate for ranking the strategies [10].

In another study shakerardekani et al (2020) provided some solutions to improve the quality of Iranian pistachios while investigating the number of scientific studies conducted on aflatoxins of Iranian pistachios from 2014 to 2018. They reported that over the recent years, there had been increasing demands for healthy pistachios in Iran and the world. SWOT matrix evaluation indicated serious weaknesses of internal factors and high volume of aflatoxin threats in the Iranian pistachios [12].

In the present study it was attempted to extract a group of management strategies by analyzing the strengths, weaknesses and threats of the Iranian pistachio industry.

2. Materials and methods

In this study, the results of the status analysis were expressed in the form of SWOT (strengths, weaknesses, opportunities, and threats). By strengths and weaknesses, it is intended to refer to the internal superiorities and advantages and its internal problems and shortcomings. Opportunities, advantages, or superioritis are achievable in a certain environment for the pistachio industry, and threats are the risks or adverse consequences an industry is faced with from the outside.

Strengths in the pistachio industry include the high flavor quality of the Iranian pistachio, the young age of the current trees, the inherent resistance of pistachio trees, long life cycle of pistachio tree, Iran's valuable experience in pistachio, Iran's capability to stabilize pistachio exports, the vast cultivation area in Iran (about 400,000 hectares), the tradition of pistachio exports in Iran, the relatively little need of pistachio trees to water, the concentration of areas used for pistachio cultivation in Iran, the reduction of aflatoxin through implementing green corridor and HACCP projects, and Iran's high status and ranking in the global production of pistachio.

Weaknesses of Iran's pistachio industry include lack of appropriate national and international strategies and policies, fundamental shortcomings of conducting research, development and education, lack of reliable information and data on pistachio in the country, disorder and inconsistency of pistachio-related institutions and organization, lack of national supporting institutions, the wide extent of micro-ownership, low productivity of pistachio trees in Iran, lack of direct access to consumers across the world, the fundamental shortcomings of the advertising and marketing systems, failing to use modern scientific methods and technologies in processing, shortcomings of health monitoring system in pistachio industry, and the shortcomings of national laws and regulations.

Opportunities in the country's pistachio industry include increased welfare, favorable global consumption pattern, creating a superior species, a superior species suitable for different regions of Iran, a more resistant species against pests and frosts, a more productive species (having a higher productivity), a species with a stable biennial bearing, slow return of capital (a major obstacle to short- and medium-term competition), lack of suitable ecosystems for pistachios in other countries, nationalization of the pistachio (expansion of pistachio cultivation to other provinces), and the possibility of attracting government support and sponsorship.

The threats of pistachio industry include aflatoxins, the vulnerability of different species (biennial bearing, frost, pests, etc.), water crisis in Iran and the Middle East, traditional irrigation systems, higher prime cost in comparison to other competitors, inappropriate interventions and decisions made by managers, the unfavorable international atmosphere against the Iranian trade, the static and inflexible status of pistachio organizations in Iran, the increasing growth and development of competitors, and the stability of Iranian pistachio prices in the world.

3. Results

In this study, a group of strategies have been extracted by analyzing the strengths, weaknesses and threats of the Iranian pistachio industry and reviewing the strategies and policies of the base models. These strategies are as follows.

Strategy 1: Developing management and planning

To realize its vision and goals, the Iranian pistachio industry requires a proper organizational infrastructure. Providing extensive services to members, having an effective presence in decision-making areas, and playing an active role in the pistachio industry is possible only through being equipped with an efficient structure, a proper planning, qualified human resources, and up-to-date management systems. Moreover, in the current conditions, given the multiplicity of governmental and public decision-making organizations in the pistachio industry, this industry does not have a desirable status and position. The other problems include lack of appropriate strategies and policies for this industry and inconsistency existing between the related organizations. Policies related to this strategy include formulating a strategic plan for the pistachio industry, explaining and promoting the position of private organizations working in pistachio industry, and establishing a coordination system for pistachio industry organizations. This strategy is applied in order to maximize the strengths (the concentration of areas used for pistachio cultivation in Iran) minimize the weaknesses (lack of appropriate national and international strategies and policies, the existence of disorder and inconsistency in pistachio-related organizations, the lack of national supporting organizations, and the wide extent of micro-ownership) and minimize the effect of environmental threats (inappropriate interventions of the government and the static inflexible status of pistachio-related organizations in Iran).

Strategy 2: Developing advertising and marketing systems

This strategy attempts to maintain and develop the existing market and create new national and international markets. Thus, besides maintaining the current position of Iranian pistachios, the Iranian pistachio industry can be developed by organizing and designing advertising and marketing systems. The favorable taste of Iranian pistachios and the stability of exports, and the current position of Iranian pistachios are among the strengths that can be considered in this strategy. Developing a system-based advertising and marketing facilitates the exports of pistachio products. Advertising, based on brand and joint advertisement, is one of the policies related to this strategy. Moreover, other approaches to realize this strategy include training and coordinating pistachio exporters for applying modern and appropriate methods, identifying sales markets and method used to negotiate with foreign buyers, and introducing the product to customers. Major policies in this regard include creating an advertising and marketing system, using a single brand, establishing coordination between pistachio exporters, applying joint advertisement methods, advertising and promoting the Iranian pistachios, developing production and packaging methods, identifying the customers' needs and expectations.

This strategy aims at maximizing the strengths (high flavor quality of Iranian pistachio, Iran's potential to stabilize pistachio exports, pistachio export tradition in Iran

especially a fifty-year history of exports in Rafsanjan, Iran's high global ranking in pistachio production), minimizing weaknesses (lack of direct access to consumers in the world), having a maximum use of opportunities (increasing welfare and favorable global consumption pattern), and minimizing the impact of environmental threats (the unfavorable international atmosphere Iranian trade, increasing growth of competitors, stable price of Iranian pistachios in the world).

Strategy 3: promoting knowledge and technology

Nowadays, technology and innovation have a unique status in all areas of human life and activity. The prevalence of a knowledge-based economy and the evolution of approaches of acquiring, maintaining, and developing knowledge have changed the attitudes of governments and organizations towards the factors of development. The Iranian pistachio industry is always required to seek to raise the boundaries of technology and innovation in pistachio industry. Ignoring science and technology will lead to backwardness from the rapid global developments. In this regard, the Iranian pistachio industry requires the cooperation of universities and research centers as knowledge producers and also the support of various sectors as the pistachio industry activists. Establishing an organized relationship with guild and specialized unions and organizations active in the pistachio industry of developed countries will also lead to absorbing up-to-date technology and disseminating it across the country. The policies related to this strategy include using successful experiences, expanding research and educational activities, developing information and communication technology in the Iranian pistachio industry, updating the knowledge and skills of members, attempting to provide the required background for implementing new technologies in the pistachio industry, and systematizing information about the pistachio industry. This strategy aims at maximizing the strengths of Iran's experience in pistachios (the tradition of pistachio exports in Iran, reduction of aflatoxin through implementing the Green Corridor project and HACCP), minimizing weaknesses (fundamental shortcomings of conducting research, development and education, lack of reliable information and data on pistachio in Iran, applying scientific methods and up-to-date technologies in processing), and minimizing the environmental threat of species vulnerability (biennial bearing, frosts and pests) are used.

Strategy 4: Absorbing national and international support and sponsorship

In order to enjoy the power of law, the necessary legal infrastructure is required to be provided. In fact, the individuals or entities in charge of pistachios are required to be supported legally. Moreover, due to the national nature of the pistachio, it is possible to absorb governmental supports as well. Policies related to this strategy include developing the necessary laws and regulations, negotiating to resolve the water crisis, communicating with foreign organizations, and absorbing international support to minimize the weaknesses related to shortcomings of national laws and regulations, extending micro-ownership, and attempting to have the maximum use from opportunities of slow capital return (a major obstacle to short- and medium-term competition), lack of suitable ecosystem diversity required for pistachio cultivation in different countries, nationalization of pistachio (expanding pistachio cultivation to most provinces), and the possibility of absorbing

governmental support to minimize the environmental threat of the water crisis in Iran and the Middle East.

Strategy 5: Increasing productivity

At present, the productivity of Iranian pistachios is about one-half of the world average. This indicates the unfavorable productivity status in the Iranian pistachio industry. Moreover, the prime cost of Iranian is higher than that of the competitors. This strategy aims at eliminating these shortcomings in the pistachio industry. The main measures that can be taken for the realization of this strategy include developing the superior species, solving the problems of micro-ownership, and promoting scientific and managerial methods in production. The policies of this strategy include developing superior species, improving access to quality raw materials, developing production techniques and horticultural methods, promoting scientific and managerial methods in production, and improving the irrigation status. This strategy aims at using the strength of current young trees to the maximum, intrinsic resistance of pistachio tree, long life cycle of pistachio tree, the vast area of cultivation in Iran, relatively little need of pistachio tree to water, the concentration of areas used for pistachio cultivation in Iran and minimize the weakness of low productivity of pistachio tree in Iran and using opportunities (to the maximum) for creating a superior species and minimizing the effect of environmental threats and vulnerability of species (biennial bearing, frosts and pests), higher prime costs (in comparison to competitors) and traditional irrigation systems.

Strategy 6: Developing monitoring, evaluation and control systems

Monitoring refers to reviewing and recording the performance of a system in comparison to a basis (such as a standard) or reference. Control refers to leading the behavior of a system close to or away from a particular reference. It is commonly attempted to minimize the deviation of the system behavior from a certain reference. This attempt is a kind of restraint on the system's behavior. The prerequisite of control is monitoring. The monitoring findings then need to be processed. This processing is called evaluation. Based on the result of evaluation, it will be necessary to take action to direct the behavior of the system towards a certain reference. The main purpose of this strategy is to ensure the proper functioning of the pistachio industry chain at different levels and obtain information about the deviations of functions in comparison to the approved or accepted principles of the pistachio industry. Several factors are needed to implement this strategy. The first factor is the basis of measurement and evaluation. The aforementioned basis can be macro and operational goals at different levels of pistachio industry. The second factor is the evaluation procedure in which the evaluation period, the evaluating authorities, and the evaluation method are determined. The third factor refers to indicators and evaluation criteria and the way to measure them. The fourth factor also refers to the procedure and instructions for correcting deviations. The lacks or weakness of any of the abovementioned factors prevent monitoring and control system from functioning properly. After monitoring and control, the results are used as feedback for future planning in the pistachio industry. The policies related to this strategy include formulating a monitoring, evaluation, and control system with an emphasis on health, implementing a monitoring, evaluation and control system in the pistachio industry with an emphasis on health, preparing,

developing and implementing quality standards in the pistachio industry chain, and creating the required legal supports for an organization. This strategy aims at applying the maximum power to reduce aflatoxin through the implementation of the Green Corridor and HACCP, minimizing the shortcomings of health monitoring in the pistachio industry, and minimizing the environmental threat of aflatoxin.

The outlines of operational plans for implementing strategies

In order for the strategies to be implemented, the strategic plans are required to be transformed into specific operational and executive plans so that they can be implemented. Here, one or more operational plans are proposed for each of the extracted strategies.

Proposed operational plans related to the first strategy (developing management and planning) include formulating a strategic plan for the pistachio industry, designing the structure of tasks, responsibilities, and interaction of institutions working in the pistachio industry, designing the implementation system and evaluating the strategic plan, setting up a private organization structure, investigating and reviewing for the purpose of developing methods of financing private organizations, creating a system for receiving the members' suggestions and opinions, measuring the members' satisfaction on a continuous basis, designing and implementing a system for employing human resources, providing welfare facilities to members, designing an evaluation system, and measuring the performance of existing associations, holding periodic and regular meetings with organizations and authorities of the country for introducing opinions, demands, limitations, problems and existing opportunities, and designing and implementing accounting and auditing systems.

Proposed operational plans related to the second strategy (developing advertising and marketing) include conducting studies for designing advertising and marketing systems, establishing a communication management system to make communications with customers and beneficiaries, conducting studies to identify new pistachio-related products, conducting studies on improving the packaging status of pistachio products, holding seminars, and exhibitions in other countries in order to promote Iranian pistachios, determining a single brand for Iranian pistachio exports, and formulating efficient procedures for pistachio exports.

The proposed operational plans related to the third strategy (promoting knowledge and technology in the Iranian pistachio industry) including creating scientific and technical databases, designing and updating websites, collecting accurate and up-to-date information on the pistachio industry, completing the pistachio industry database, information providing correct and timely information to the members, disseminating pistachio industry information in mass media and cyberspace, publishing books, magazines and periodicals, providing professional counselling services, holding meetings and conferences, seminars and educational and briefing workshops, creating an organized communication with relevant domestic and foreign research centers to exchange research achievements, assessing the educational needs of pistachio industry's supply chain, and holding professional courses.

The proposed operational plans related to the fourth strategy (absorbing national and international support) include establishing an active interaction with various organizations and

institutions to absorb support, disseminating the pistachio industry information in mass media and cyberspace, holding meetings, conferences, seminars and educational and briefing workshops at both national and international level, providing various products for different markets, formulating the required national laws and regulations and following their approval, establishing proper relationship with relevant international organizations and institutions in order to absorb international support.

The proposed operational plans related to the fifth strategy (increasing productivity) include cultivating new products to achieve market opportunities, conducting development studies and improving the supply of materials and inputs, conducting studies on the development of quality standard, conducting studies on developing and improving equipment supply, conducting studies on designing the optimal irrigation and nutrition model for pistachios, providing the gardeners with information on scientific and managerial methods, conducting studies on micro-ownership management, and conducting studies on organizing and improving transportation services in the whole industry.

The proposed operational plans related to the sixth strategy (developing monitoring, evaluation, and control systems) include conducting studies on designing procedures and indicators of monitoring, control and evaluation of pistachio production, conducting studies on designing procedures and indicators of monitoring, control and evaluation of pistachio processing, conducting studies on designing procedures and indicators of monitoring, control and evaluation of pistachio exports, conducting studies on improving the health status of pistachio products, preparing guidelines and hygienic procedures regarding production, processing and export, formulating standards and methods of improving the quality of production, processing and exports.

A SWOT-based analysis of studies

A SWOT-based analysis is one of the strategic tools for ad internal strengths and weaknesses with external opportunities and threats. According to this model, an appropriate strategy maximizes strengths and opportunities and minimizes weaknesses and threats. The issues raised in this study were divided into two categories: internal and external factors. Strengths and weaknesses of internal factors and opportunities and threats of external factors have been extracted in the present study. The strategies were then extracted from the comparison of factors (recorded in Table 1) as the results of the present study.

Table 1. The analysis of strengths, weakness, opportunities, and threats

Internal factors	**Strengths** 1. Having a high global ranking in terms of production and export of pistachio 2. The potential of importing foreign currency 3. Market's need for technology product	**Weaknesses** 1. The infection of product with aflatoxin 2. The inability to keep aflatoxin levels constant after processing until delivery to the customer 3. Failing to follow health principles

	4. The preference of flavor, taste, and form of processed products to those of the competitors 5. Proper climatic conditions for production 6. The possibility of preparing new food products from pistachio 7. Lower production costs (in comparison to the US, the main competitor) 8. The possibility of using technology by-products 9. The presence of a strong union of technology product producers 10. The presence of a Pistachio Research Center in Iran 11. The presence of Pistachio Safety *Research Center* (PSRC) 12. The presence of research tools 13. Multiple cases of patent 14. The formation of foundations of technology in Iran over the last few decades 15. The production of more than 90% of raw materials for processing technology in Iran 16. The possibility of manufacturing 100% technology in the country 17. Government's interest in research investment 18. Existence of the required manpower for technology	4. Exporting technology products in bulk 5. Insufficient usage of experts in agricultural machinery and food industry in factories where technology is produced and used 6. Lack of diversity in technology products 7. The seasonal nature of the demand and use of technology 8. Failure to comply with international standards on technology and technology products 9. Little advertising and marketing about technology and its products overseas 10. High inflation 11. The lack of stability and economic regularity 12. Lack of variety in the type of packaging in terms of shape, weight, and content 13. High customs tariffs for the import of packaging systems 14. Poor quality of packaging materials 15. Novelty of new packaging systems 16. Instability of pistachio market 17. Traditional processing of a high percentage of the products 18. The dominance of major buyers on the market 19. High bank interest rates 20. The seasonal nature of need for technology

	19. Existence of Iranian specialists 20. The presence of active technology production centers 21. Possibility of selling technology to other countries 22. The presence of wealthy technology buyers 23. The possibility of recycling pistachio waste, technology product (design of machines) 24. Creating added value with technology 25. Creating a labor market 26. Changing the social status of workers 27. Reducing unemployment 28. Contributing to cultural development 29. Stabilization of rural population 30. Creating good relations with neighboring countries importing pistachios 31. Development of relations with friend countries 32. Increasing national prestige	21. Inefficiency of energy consumption in technology 22. Ignoring the negative environmental effects in the production of technology 23. Insufficient profit in production and industry 24. Insufficient support for copyright law 25. Weakness of labor law 26. Weakness of social security laws 27. Lack of principled support provided by the government for industrial production projects
External factors Opportunities 1. Increasing the area under cultivation in producing countries. 2. Willingness to buy technology and technological product from Iran due to cheapness with the condition of	The strategy of improving exports and importing foreign currency 1. Providing customs facilities for exporters of ready-to-eat pistachios packaged in small packages weighing up to one kilogram	

contamination and acceptable level of technology. 3. The welcome compulsion of regional and international exporting countries to use technology 4. Developing nature of pistachio- producing countries and lack of expertise in technology 5. Having friendly relations with countries producing technology products	2. Creating the necessary financial facilities for technology exporters Technology development strategy: 3. Entrusting all affairs to unions, associations, organizations and supporting them 4. Allocate appropriate research budgets 5. Directing and guiding research towards designing by-product processing machines 6. Providing proper encouragement of technology value for inventors 7. Allocating financial facilities to production companies with specialized staff and very low interest rates 8. Advertisement in buyer countries	
External factors Threats: 1. Lack of buying aflatoxin contaminated pistachios and emphasizing health issues 2. Insisting on the policy of bulk import for pistachios by buyers to create added value in the target country via packaging 3. Variety in the methods of providing pistachios and packaging systems 4. Using modern technology in processing and packaging technology in the United States (the main		Strategies of reducing and controlling contamination 1. Establishing laboratories for determining the amount of fungal and microbial contamination 2. Improving technology in preventing contamination More value-added strategies 3. Reducing the export of bulk pistachios and moving towards packaging with international standards 4. Using specialists in technology centers 5. Making the processing machines multi-purpose so that they can be used in off seasons 6. Integrating innovation with technology

competitor in modern technology) 5. The Dominance of the US (the main competitor in modern technology) on the market and buyers		Market domination strategies 7. Moving towards global industry standards 8. Upgrading the packaging technology 9. Organizing the economic situation 10. Amendment the labor and employer laws 11. Supporting work and production culture

Determining the indicators for determining the desired status and the current status

Based on the results of the SWOT-based analysis in this study, the indicators determining status are as follows (Table 2).

Table 2. The indicators determining status

Number	Measurement parameter	Indicator	Measurement unit
1	Reduced contamination of the product	Aflatoxin rate	ppb
2	Complying with health protocols	Microbial rate	The related unit
3	Profit	Prime cost and selling price	Rial per kilo
4	Importing foreign currency	Export rate	Dollar
5	Improved market	Export rate	Dollar per ton/kg
6	Growth of packaging industry	Export rate	Kg per number of packages
7	Growth of technology production	Machines	Number per year
8	Applying technology	The number of processing units and packaging factories	Machine per year
9	Encouraging exports	Exporting technology products	Ton per year
10	Improved status of unemployment	Unemployment rate	Percent
11	Improved economic status	Inflation rate	Percent
12	Progress in using technology	Processing rate with machine	Percent
13	Giving significance to research	Research budget	Percentage of gross national product
14	Progress in technology research	Scientific articles	Number per year

4. Discussion

Based on the results of this study, optimal strategies are required to be defensive. In this case, a strategy must be determined that, depending on the weaknesses, can reduce or eliminate the damages caused by the threats ahead. These results indicate an urgent need to improve the structure of the current status of the Iranian pistachio, especially in terms of micro-ownership, health, and reduced crop contamination.

Okhovvat (2007) reported that aflatoxin, as a potentially dangerous toxin, is involved in reducing the possibility of pistachio marketing competition in the world. Some countries, especially the United States, are trying to increase their share of pistachio exports and exclude Iran through using this status in the best way possible. Thus, it is necessary for Iran to pay more attention to international standards; Iran is required to invest on pistachio processing and trade industry. Aflatoxin-producing fungus not only produces a toxin but also pave the way political-economic actions by the competitors [12].

Haghdel et al (2017) investigated the scientific production on aflatoxin in Iranian pistachios. In this regard, they have used indicators such as the number and type of studies, articles, or abstracts presented in conferences, research projects, theses and dissertations and books published on aflatoxin of pistachios, in a 5-year evaluation period (2009 to 2013). The results of their study indicated that during the aforementioned evaluation period, as many as 32 research projects had been implemented, 44% of which were related to the research centers of the Ministry of Agriculture Jihad, including research institutes and research centers, and the rest were related to the educational and research centers of the Ministry of Science, universities of medical sciences, Azad University, and others. As many as 68.75% of the projects had a fundamental approach and 45.45% of the them were conducted with an applied approach. A total of 149 scientific articles had been published in the aforementioned period; scientific-promotional articles accounted for 1.35%, and scientific-research articles accounted for 98.65%. As many as 41% of the articles had an ISI index and 33.6% had a JCR index. During the aforementioned period, 14 volumes of books were published of which were Persian books, 5 were English books and 3 were translations. The number of inventions and innovations registered in this period was 7. During the abovementioned period, 91 theses and dissertations had been prepared. By collecting, processing and analyzing data and information about events, procedures and trends of the environment, the theses and dissertations reported that the most important factor in the field of aflatoxins in Iranian pistachios was increasing demand for healthy pistachios having no aflatoxins for consumption in both Iran and the world. In line with the results of the present study, their results in evaluating the SWOT matrix indicated the weakness of internal factors and the large number of threats for regarding pistachio aflatoxin in Iran [13].

Shakerardekani (2018) reported that physical separation of spotted pistachio kernels (especially brown and black spots) greatly reduces the aflatoxin contamination of pistachio shipments [14].

By analyzing data (2014-2018) on aflatoxin in pistachios, Shakerardekani et al (2020) found that several factors such as increasing awareness in regarding health, changing lifestyle, eating healthy food, having healthy facilities, increasing economic growth, producing new products, changing the biological infrastructure, disturbing the balance in nature, and management policies regarding goods export and import to different countries have increased restrictions for a healthier and aflatoxin-free pistachio. They reported that proper strategies, given the weaknesses, are required to reduce or eliminate damages posed by the threats [11].

5. Conclusion

Although Iran is still ranked first in pistachio science production, it has ceded the first rank in pistachio production to its longtime rival, the United States. Thus, more efforts are required to be made to revive Iran's first rank in pistachio production in competition with other countries, especially the United States. Moreover, the existence of only one specialized research institute for pistachio, insufficient research budget, and the limited number of pistachio faculty members in Iran are among the gaps existing in the country. The results of this study show the need to modify the structure of the current status of pistachio production regarding healthy pistachio production and pistachio health, especially for micro-ownership. Although, in recent years, compared to the previous years, good progress has been made regarding the improvement of health and crop yield especially by implementing research projects as well as education and promotion (*Yavaran-e Towlid* (production assistants), agricultural zoning system, specific researchers, and generally creating proper communication with gardeners), but in order to gain more global markets, it is necessary to further improve the quality and health of pistachio products.

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