ACCEPTED ARTICLE

Strategic Analysis of Establishing a Food Valley in Iran Using SWOT Method

Morteza Akbari[1], Ali Shafiee[2], Behzad Mohammadian[3], Pouria Ataei[4], Hamid Padash[1*], Mohana Shahmoradi[5], and Niloofar Rezaeei[2]

1. Faculty of Entrepreneurship, University of Tehran, Tehran, Islamic Republic of Islamic Republic of Iran.
mortezaakbari@ut.ac.ir

2. Allameh Tabataba'i University, Tehran, Islamic Republic of Iran.
3. Faculty of Management and Accounting, College of Farabi, University of Tehran, Qom, Islamic Republic of Iran.
4. Tarbiat Modares University, Tehran, Islamic Republic of Iran.
5. Department of Agricultural Extension and Education, Razi University, Kermanshah, Islamic Republic of Iran.
***Corresponding author; padash@ut.ac.ir**

Abstract

The lack of recognizing Food Valley's potential and the lack of incorporating open innovation into food industry strategies are serious obstacles that debilitate their sustainability and viability. A mixed method approach was used to answer the question of what are the external and internal in a SWOT analysis to evaluate the possibility of the establishment of a food valley in Iran. Data was collected using structured interviews with 16 entrepreneurship and food industry experts. The SWOT matrix is based on 42 identified factors, drawn into four categories of strengths, weaknesses, opportunities, and threats. A total of 17 strategies were presented to establish Food Valley, including 5 offensive strategies, 5 revision strategies, 3 diversity strategies, and 4 defensive strategies. The results found that building trust, creating joint professional workgroups in food companies, having cooperation contracts for the exchange of skilful workforce, sharing information, developing continuous relationships with scientific centers and academia are among the most important strategies for establishing the Food Valley in Iran. Prioritizing alternative strategies illustrated that Since Food Valley is a critical factor in the field of food security, this study contributes to the literature on food security. Policymakers could design special plans to promote strategies for launching and establishing Food Valley and the adoption of open innovation by the agri-food industries and SMEs and emphasize the effects of this paradigm to improve innovative products and services.

Keywords: Agri-Food Sector, Entrepreneurship, Food Industry, Food Valley, Open Innovation.

Introduction

Food security is one of the most challenging issues (Akbari et al., 2022; Akbari, Fozouni Ardekani, et al., 2023; Akbari, Mahavarpour, et al., 2023), and there are hundreds of millions of people, who do not enjoy an acceptable level of food security, it is predicted that there will be a severe threat to feeding more than 9 billion people in 2030 (O'Hara & Toussaint, 2021). Several studies showed that the future of food-agricultural systems is also subject to global change processes and unexpected shocks (including conflicts, climate change, and economic shocks) (FAO, 2020; Gross, 2022). This will be sustainable and inclusive as long as food-agricultural systems transform, become more resilient, and provide healthy and affordable diets for people (FAO, IFAD, UNICEF & WHO, 2022).

In this regard, an open innovation approach can create dynamism and coherence in agro-food systems (Solarte-Montufar et al., 2021). In this approach, SMEs' food can play an important role in building flexibility and sustainability in the food systems (Ortiz-Miranda et al., 2022). In addition to ensuring the stability of the food supply, these businesses can have opportunities to participate in new forms of cooperation that enable them to compete in national and international markets (Fortes et al., 2020). Therefore, the participation of SMEs in the food and agricultural industries in R&D activities has been considered an essential activity, which has led many multinational companies to enter the agricultural sector to take advantage of opportunities (Zarafshani et al., 2010).

Today, the development of open innovation as a competitive strategy in the agricultural system is rapidly expanding (Solarte-Montufar et al., 2021). In addition to helping to find innovation partners, bringing them together, and playing a facilitating role in the food production and supply chain, Food Valley can contact innovation partners for the ideation and conceptual stages of the innovation process (Omta & Fortuin, 2013). Considering the potential opportunities provided by the Food Valley, and the importance of regional innovation systems in food security, the future food systems will be driven to apply open innovation (Bigliardi & Filippelli, 2022). However, this critical role can only be fully realized if a proper approach to adopting the innovation management system is applied according to the conditions and facilities available in each region. This emphasizes the necessity of a detailed analysis of the current situation and the feasibility of launching and establishing a support network for the innovation process in the food system.

Many studies in the field of agri-food have illustrated that open innovation, regional innovation systems (such as Food Valley), and collaborative networks of food production can bring

forward resilient approaches to increase sustainability production and competitiveness (Bogers et al., 2020; Pontieri et al., 2022). Linking Food Valley with open innovation leads to replacing conventional intraorganizational producer-driven innovation processes with activities that increase knowledge flows among SMEs' boundaries (Dabic et al., 2022). However, there are many opportunities to study the interrelation between open innovation and Food Valley in crises. These global challenges have highlighted the vulnerability of SMEs and the agri-food sector and forced companies to find more supple systems for innovation frameworks (Venturelli et al., 2022). Without innovation in Food Valley, several SMEs are highly vulnerable to market turbulence, and their future viability and resilience will be at risk (Dabic et al., 2022; Solarte-Montufar et al., 2021). Furthermore, the lack of recognizing Food Valley's potential and the lack of incorporating open innovation into food industry strategies are serious problems that debilitate their sustainability and viability. Some studies have used the approach of open innovation in the agri-food sector to improve innovation performance (Bayona-Saez et al., 2017), healthy food (Pontieri et al., 2022), and sustainability-oriented innovation (Troise et al., 2021).

Around the world, various measures have been taken to launch Food Valley, some of which include Regio Food Valley, Food Valley of Bjuv, UK Food Valley, and Ukrainian Food Valley. Regio Food Valley is the top region for knowledge and innovation in healthy and sustainable food. This region is not only renowned for its food-related expertise and technology, but also for its outstanding infrastructure and facilities for living, working and recreation. Regio Food Valley identified as the leading agro-food centre in Europe. It is a framework of cooperation involving eight municipalities with altogether 350,000 residents, and many educational institutions and businesses. Food Valley of Bjuv is a innovative practice in Sweden. The companies in Bjuv have long experience of taking advantage of each other's residual flows. In a circular economy, nothing is regarded as waste, but as a resource. Food Valley of Bjuv is a cluster where entrepreneurs and innovators get together to develop the future of food production and food companies. Networking and cooperation between research, entrepreneurs and industry is an important part in meeting future consumer and market demand. The UK Food Valley will support growth and encourage inward investment through promoting the scale, diversity and importance of the food sector to the area, and by ensuring that existing food sector companies and new investors are supported. The UK Food Valley currently supports around 75,000 food sector jobs, 18% of jobs in the area compared to 4% of the UK workforce. Key priorities for the UK Food Valley are accelerating food chain automation and digital technology adoption to deliver productivity growth and high value jobs, delivering low carbon food chains from

farm to fork by focusing on low carbon technologies for production, processing and distribution, and developing the market potential of naturally good for you foods and new sources of protein. Another successful food valley experience in the world is Ukrainian Food Valley. Ukrainian Food Valley is an institution that is intended to be a catalyst for the development of the AgriFood Ecosystem of Ukraine as a sustainable and self-sufficient innovation system. Ukrainian Food Valley through joint trainings creates the environment and brings together participants with aim of joint production and export of high added value goods and services. However, few studies have explored the Food Valley based on the open innovation approach. Therefore, further studies must theorize establishing Food Valley according to the open innovation indicators in the agri-food sector.

Since the application of this approach in the regional food system of Iran has not been widely investigated, Therefore, the purpose of this study is assessing the feasibility of establishing a Food Valley In Iran. This study contributes to conceptual and theoretical improvement by recognizing new strategies for launching and establishing Food Valley via open innovation. It provides policymakers, researchers, and practitioners with reflections on how Food Valley may be extended to support a comprehensive strategy aimed at sustainable food production in the agri-food sector. Furthermore, this study can help to understand the relationship between Food Valley and open innovation. By answering this question, we contribute to the understanding of the strengths, weaknesses, opportunities, and threats that Food Valley faces when establishing and prioritization strategies for Food Valley development. Furthermore, the results of this study could help to policymakers, researchers, and practitioners for planning comprehensive strategies to launch Food Valley by the agri-food industries and SMEs and emphasize the effects of this paradigm to improve innovative products and services.

2. Methodology

A mixed method (quantitative and qualitative methods) was used to identify the factors affecting the establishment of Food Valley in Iran. This approach includes three steps: (1) identifying the factors influencing the establishment of Food Valley, (2) formation of a SWOT matrix, accreditation, and prioritization of criteria by SWOT-AHP and (3) presenting possible strategies and prioritizing them using the TOPSIS method.

2-1. Identifying factors influencing the establishment and launch of Food Valley

First, a literature review was used to establish the feasibility of a Food Valley in Iran. Then, to determine the related factors and match the identified factors, the interview method was used.

The interviewees included 16 experts in the field of entrepreneurship and the food industry, who were selected using the purposive and snowbal sampling method (Table 1). Sampling continued until the saturation stage. To find a larger sample and establish rapport with the respondents, we applied the snowball chain of recommendation, considering the population's specific characteristics (Miles & Huberman, 1994). Then the experts exchanged opinions about the strengths, weaknesses, opportunities, and threats of the establishment of Food Valley. A total of 16 structured interviews were conducted, each lasting an average of 45-60 minutes. The interviews were analyzed through theoretical coding (open and axial coding). Inclusion critera: The experts in this research were selected in such a way that they had at least 2 of the following 3 conditions (although most of them had all the conditions):

1. The person in question should be one of the experts or managers in the field of executive management. 2. He/she has the experience of decision-making or he/she has the experience of implementing it in his portfolio. 3. Be familiar with the field of food industry in general and food industry development in particular.

Table 1 Respondents profiles.

Number	Gender	Age	Degree	Experience
P1	Male	35	MSc	12
P2	Male	58	MSc	21
P3	Female	38	PhD	7
P4	Male	39	PhD	6
P5	Male	33	MSc	6
P6	Male	41	MSc	9
P7	Male	56	PhD	20
P8	Male	48	PhD	15
P9	Female	42	MSc	11
P10	Female	37	PhD	9
P11	Male	31	MSc	5
P12	Male	30	MSc	7
P13	Female	43	MSc	10
P14	Male	55	PhD	23
P15	Male	54	PhD	20
P16	Male	36	MSc	6

2-2. Formation of SWOT matrix, validation, and prioritization of criteria using SWOT-AHP combination

At this stage, the extracted codes were categorized in the form of a SWOT matrix (strengths, weaknesses, opportunities, and threats to the establishment and launch of Food Valley). SWOT analysis is one of the practical methods of strategic analysis that is used to combine and generalize the content of environmental analysis (Dong et al., 2021). This method comprehensively considers various factors of the internal and external environment and specifically categorizes them into four elements: internal strengths and weaknesses and external opportunities and threats (Noorani et al., 2022). To verify the identified factors, a detailed list of SWOT factors was sent to five experts. They were asked to rank these factors based on their relationship with the feasibility of establishing Food Valley.

The rating scale was from 1 (not relevant) to 5 (very relevant). Therefore, only those factors considered that their average value based on experts' opinions was higher than the assumed hypothetical average, i.e. 3. Since the SWOT analysis does not provide an analytical tool to determine the importance of identified factors or the ability to evaluate decision-making options according to these factors (Hao et al., 2022), to evaluate the relative importance of each factor and its influence on developing appropriate strategies, analytical hierarchy process (AHP) technique was used. In this technique, a logical framework for the factors is created, and alternative criteria and decisions are quantified to obtain an overall ranking for the importance of all SWOT factors. Therefore, a 9-item scale was designed (1 = equally important, 9 = completely important). Then, five experts evaluated the relative importance and strategic strength of the sub-factors of the four SWOT factors based on pairwise comparisons. To verify the reliability of pairwise comparisons, the consistency ratio (CR) of each comparison was calculated.

2-3. Prioritizing strategies with the TOPSIS method

Finally, possible strategies are designed based on identified strengths, weaknesses, opportunities, and threats. These strategies are developed by using the strengths and capabilities of different stakeholders while minimizing their weaknesses and risks (Li et al., 2023). By combining each strength, weakness, opportunity, and threat, improvement strategies in four modes:

SO/ attack strategies: strategies are strategies that are based on internal strengths and environmental opportunities.

WO/ improve strategies: strategies are strategies that are formed based on internal strengths and environmental threats.

ST/ defend strategies: strategies are strategies that are formed based on internal strengths and environmental threats.

WT/ exit/defensive strategies: strategies are strategies that are designed and presented based on environmental threats and internal weaknesses.

Then, the importance of each strategy was determined using the TOPSIS technique. TOPSIS is a technique for prioritizing options based on the shortest distance from the positive ideal solution and the furthest distance from the negative ideal solution. In this study, the developed strategy was used as an option and criteria (required cost, amount of time spent, impact on the country's food industry, and feasibility) to evaluate the strategies and give weight to them.

3. Results

The factors affecting the establishment of Food Valley were identified through extensive study in international literature and related documents. This process was followed by identifying the leading strengths, weaknesses, opportunities, and threats. After evaluating the experts and reaching a consensus regarding the relationship of the identified factors with the subject under investigation and removing irrelevant factors, the identified factors were categorized in the form of a SWOT matrix (10 strengths, 11 weaknesses, 10 opportunities, and 11 threats).

In the next step, the relative importance of the identified factors in the establishment and launch of the Valley of Food was determined using Hierarchical Analysis (AHP) and based on the evaluations provided by experts (five university professors and food industry entrepreneurs). After prioritizing the SWOT criteria, the relative weight of each sub-criteria and its priority in the possibility of launching and establishing Food Valley was estimated (Table 2). Given that the consistency ratios (CR) for each of the pairwise comparisons is lower than 0.1, the consistency of the comparison matrix was confirmed, and it indicates the lack of contradiction in the evaluations and judgments of the experts.

The creation of synergy was one of the most important strengths in the advancement of the launch of Food Valley. Meanwhile, focusing more on innovative technologies becoming more competitive, and improving quality are ranked second and third in importance, respectively. Also, the existence of an elite force, cultural diversity, and diverse climate, the authenticity of Iranian food, cheaper labor, extensive infrastructure in the country, support of the private sector and non-governmental organizations, and finally, related higher education institutions were placed in the next priorities, respectively. Among the existing weaknesses, administrative

bureaucracy is ranked first, conflict of interest, and the lack of a suitable platform for risky investment are placed second and third. Prioritizing the identified opportunities, reducing imports, the possibility of easy use of expert forces, and creating Islamic food branding are ranked first to third, respectively. Based on expert evaluation and AHP analysis, lack of coherent management, lack of infrastructure provision, unexpected price growth, and fear of lack of raw materials were the main threats to the advancement of the establishment and launch of Food Valley in Iran.

Table 2. Strengths, Weaknesses, Opportunities, and Threats of Establishing Food Valley.

	Rank	Factor loading	Weight	CR
Strengths (s)	1	Creating synergy	0.155	0.045
	2	Focus more on innovative technologies	0.131	
	3	Competitive demands and quality improvement	0.119	
	4	Elicit workforce	0.103	
	5	Cultural and climate diversity	0.095	
	6	The originality of Iranian foods	0.094	
	7	Inexpensive workforce	0.986	
	8	Wide infrastructures of the country	0.85	
	9	Support of private sector and NGOs	0.07	
	10	Related higher education institutes	0.062	
Weaknesses (w)	1	Organizational bureaucracy	0.141	0.074
	2	Interests' confliction	0.0125	
	3	Lack of proper platform for risky investments	0.0113	
	4	Incompatibility of industry needs and academic activities	0.102	
	5	The unfavorable domestic economic condition	0.098	
	6	Lack of marketing discipline	0.094	
	7	High production costs	0.082	
	8	Lack of higher organizations support	0.72	
	9	Perceived consumer risks about food production of new businesses	0.061	
	10	Brokers and middleman	0.058	
	11	Lack of efficient relationship between industry and academia	0.053	
Opportunities (o)	1	Reduce in import	0.188	0.061
	2	Ease of use of professional workforce in this industry	0.153	
	3	Creation of Islamic branding	0.145	
	4	Availability of export to neighboring countries	0.128	

	Rank	Factor loading	Weight	CR
	5	Low energy costs	0.092	
	6	Low wage rate	0.079	
	7	Use of domestic and foreign consuming market	0.061	
	8	Exchange Import	0.057	
	9	Wide employment in production, distribution, and sale sections	0.054	
	10	Integrative marketing, design, and sale	0.041	
Threats (T)	1	Lack of cohesive management	0.182	0.061
	2	Lack of necessary infrastructure	0.163	
	3	Unpredictable price growth and fear of lack of raw materials	0.116	
	4	Lack of legal support	0.096	
	5	The slowness of decision-making and policy-making processes	0.089	
	6	Increase in prices due to competition decrease	0.07	
	7	High costs of transportation	0.063	
	8	Lack of financial sources and proper facilities	0.61	
	9	Chronic economic inflation	0.59	
	10	Lack of proper rules and regulations	0.055	
	11	Government intervention in the market	0.046	

Then, by focusing on each of the SWOT criteria and analyzing and comparing them, it was possible to extract appropriate strategies (SO, WO, ST, WT) for the establishment and launch of Food Valley in Iran (Table 3). In the (SO) strategies, the main question was how to provide the necessary ground for exploiting opportunities by focusing on strengths. In Iran, like many developing countries, the strengthening of start-up foundations and the design of an entrepreneurial ecosystem based on innovation and technology are developing and evolving. Today, achieving competitive advantages in the field of food products and industries, improving quality, and maintaining it requires more focus on innovative technologies. Due to Iran's benefits from knowledge-based companies and start-ups and having significant capacities such as elite and expert personnel, high diversity, and originality of Iranian products and foods, a platform for synergy and creation of economic value-added will be provided in this field. Therefore, adopting strategies such as creating food branding and expanding activities in the field of local foods and the capacity of authentic Iranian foods can be manifested in the form of Food Valley. By analyzing external opportunities and internal weaknesses, the necessary background for WO strategies was provided. The main question for designing alternative

strategies in this field was how to realize the opportunities for establishing and launching the Food Valley in Iran, given the current weaknesses.

The existence of some obstacles and problems, such as complex administrative bureaucracy in production, conflict of interests, and lack of a suitable platform for risky investment, is one of the most important obstacles to the establishment of Food Valley. Therefore, adopting strategies such as creating different distribution channels, building trust, and providing necessary capital from internal and external sources can be effective in reducing and facilitating obstacles. Strategies (ST) were also deduced by comparing the leading strengths and threats and focusing on the question of how strengths can be used to reduce the vulnerability of the Food Valley against threats. Also, strategies (WT) were presented about internal weaknesses and external threats. The purpose of this group of strategies was how to limit the impact of current weaknesses and threats on the Food Valley by adopting defensive strategies.

Table 3. Suggested strategies.

SO Strategies	**WO strategies**
Export Encouragement and support	Providing necessary capital from internal and external sources
Developing partnerships with authentic foreign companies	Developing different distribution channels
Developing activities related to local foods and the capacity of original Iranian foods	Offering products with organizational brand
Creating an Islamic Halal brand	Trust-creation
ST strategies	**WT strategies**
Creating common professional workgroups in food companies and having cooperation contracts for the exchange of professional workforce and sharing information	Focus on marketing and strategic sales.
Diversification of products and services	Having informative advertisements for introducing platforms and attracting customer
Creating cooperation with other foreign similar platforms and organizations	Eliminate deficiencies
	Introducing Iran’s brand to domestic and international markets General improvement of the factory to be able to use probable opportunities

Finally, the presented strategies were prioritized using the TOPSIS technique. 17 developed strategies were used as options and criteria (required cost, amount of time spent, impact on the country's food industry, feasibility) to evaluate the strategies and give weight to them.

Table (4) shows "building trust", "creating the work of joint specialized groups in food companies and concluding a cooperation agreement in the exchange of information and expert personnel", and "developing continuous relations with scientific centers and universities" are among the most important alternative strategies that should be prioritized in the establishment of the Food Valley. Furthermore, "developing activities related to local foods and the capacity of original Iranian foods", "creating cooperation with other foreign similar platforms and organizations", and "introducing Iran's brand to domestic and international markets" are the last three prioritized strategies.

Table 4. Prioritizing alternative strategies by the TOPSIS technique.

Rank	d+	d	CL	Strategy
1	0.05	0.13	0.29	Trust creation
2	0.05	0.12	0.30	Creating common professional workgroups in food companies and having cooperation contracts for the exchange of professional workforce and sharing information
3	0.07	0.10	0.39	Developing continuous relationships with scientific centers and academia
4	0.07	0.11	0.39	Identification and development of cooperation contracts with authentic domestic and powerful providers
5	0.06	0.11	0.34	Diversification of products and services
6	0.07	0.11	0.41	Developing distribution channels
7	0.09	0.09	0.49	Offering products with organizational brand
8	0.07	0.10	0.41	Providing necessary capital from internal and external sources
9	0.08	0.10	0.46	Having informative advertisements for introducing platforms and attracting customer
10	0.09	0.09	0.50	Develop partnerships with authentic foreign companies
11	0.09	0.09	0.51	Export support and encouragement
12	0.10	0.09	0.52	Creating an Islamic Halal brand
13	0.13	0.09	0.60	Eliminate deficiencies
14	0.12	0.07	0.63	Focus on marketing and strategic sales.
15	0.12	0.06	0.66	Developing activities related to local foods and the capacity of original Iranian foods
16	0.11	0.06	0.63	Creating cooperation with other foreign similar platforms and organizations
17	0.11	0.05	0.68	Introducing Iran's brand to domestic and international markets

Discussion

In this study, the SWOT matrix is based on 42 identified factors, which are drawn into four categories, namely "strengths, weaknesses, opportunities, and threats". This prioritization provided a broad understanding of the factors based on their role in achieving the objectives of the study; so that it became clear what factors should be focused on to implement appropriate strategies. A total of 17 strategies, including 5 offensive strategies (SO), 5 revision strategies (WO), 3 diversity strategies (ST), and finally, 4 defensive strategies (WT), were designed.

Based on the results, the most important existing strengths of Food Valley were synergy, focusing more on innovative technologies becoming more competitive, and improving quality. Paying attention to synergy among actors is very important in optimizing the financial, social, and technical resources of Food Valley's launch. It is also possible to benefit from synergy to create and nurture relationships between supply chain actors and food value. Synergistic interaction can explain a relationship where agro-food supply chains complement and reinforce each other.

Food valley scope necessities and develop collaboration to advance food related companies and organizations. It creates research and development platforms and support collaboration between food actors. Food valley should create strong connections to other local ecosystems, as well as to national and international food research and business actors.

Innovative technologies also seem necessary in designing business models and establishing new investments. Considering that the food-agriculture supply chain is faced with several climatic, biological-environmental risks and fluctuations related to the market, logistic and political-management factors (Nyamah et al., 2017), applying innovative technologies, adapting and updating businesses in this area with various changes and risks will play a key role in the sustainability and success of these businesses.

Due to the increasing demand for healthy and sustainable foods, the formation of innovative organizations such as Food Valley will play a key role in developing solutions for the future of agriculture and the food industry. Increasing support for innovative technologies by agri-food industries and innovative organizations relies on the reality that old and ineffective technologies are largely unsustainable for the development of the food industry (Adenle et al., 2019). Therefore, innovative organizations can significantly contribute to the adaptation of open innovation related to the agri-food sector and the adoption of policies that collaborate with private and public sectors in the Food Valley.

Furthermore, Food Valley should organize joint research and trainings for the development and consolidation of its participants who practice the principles of sustainable agri-food production

throughout the whole value chain, efficient resources using, conservation, protection and improvement of energy sources, protection and development of communities, equality and people's welfare, and improving flexibility of cooperation between people, communities and ecosystems.

Cooperation and coordination between a wide range of stakeholders and beneficiaries related to the agri-food supply chain will also provide an opportunity to improve the product marketing system and reduce production costs. Establishing communication between producers and consumers and meeting different requirements, especially in the field of information related to the product, while eliminating middlemen and brokers in the food supply and distribution chain, reducing the perceived risks of consumption. Suppliers also play an important role in the food products produced. Meneguel et al., (2022) and Sanchez et al., (2023) also emphasized that the support of suppliers can improve the process of open innovation and the performance of the supply chain and create competitive benefits among agri-food industries by increasing added value.

The relevance and contribution of this study to current research lies in the applied perspective. Previous studies have mainly investigated the effectiveness of cluster organizations and specifically Food Valley in facilitating innovation in regional systems (Omta & Fortuin, 2013). Fritz & Schiefer (2009) also provide background and context for analyzing the effectiveness of cluster organizations in the agri-food innovation system. Some studies, such as Jongen et al. (2006), examined the experience of the Food Valley cluster organization. Lee et al. (2009) also investigated the Food Valley innovation system in the Netherlands as one of the most innovative food clusters in the world. Many studies also introduce food security as a current challenge (Proskova, 2018) and have proposed the need to review and adjust food security policies by focusing on adopting an innovative approach (Boratyńska & Huseynov, 2017; Shamah-Levy et al., 2017). In this context, although previous studies emphasize the formation and development of networks and support for innovation in the food sector within the framework of cluster organizations (Omta & Fortuin, 2013), there has not been a comprehensive study on the factors affecting the development of these cluster organizations in the food sector in a specific region.

Conclusions

The transition from linear towards sustainable and circular business models is one of the main challenges for the agri-food sector. These challenges are relevant in the agri-food sector, particularly in the food industry, which is taken into account by policymakers and practitioners among the main strategic components for achieving sustainable production. However, in the

food industry, reaching this target is influenced by some internal and external factors. Therefore, researchers are called to reconnoiter various practices to solve those challenges.

This study made it possible to identify internal and external factors leading to the establishment of Food Valley in Iran from the point of view of experts in this field. In this regard, due to various methodological limitations, it was tried to provide valid and acceptable results by using combined methods. For example, noting that some factors, especially opportunities, and threats, are specific and dependent on the place and context under study; therefore, to reduce mental biases and adapt the identified factors to the context (the country of Iran), the opinions and evaluation of experts in the relevance of the factors with the aim of the study was investigated. Although the experts in the field of entrepreneurship in the food industry were limited, the participants in the study had sufficient experience in this field and were representatives of people in different fields of the food industry, entrepreneurship, business, and commerce.

With specific regard to agri-food industries and SMEs, since innovative products and services are at the core of Food Valley's strategies, providing capital from internal and external sources and interaction with authentic foreign companies could lead to more sustainable and productive businesses that can create better working conditions to all agri-food industries and SMEs. In this regard, scientific centers academia, and informative advertisements could facilitate the diffusion of knowledge and new products and services of agri-food industries and enable the emergence of Food Valley in Iran. This means that policymakers, managers, and scholars should support the implementation of all strategies in establishing Food Valley. This study manifests that the shift toward the Food Valley approach can make open innovation more accessible to agri-food industries.

If we look at the four main strategies of launching and establishing Food Valley, offensive, revision, diversity, and defensive strategies, it is clear that prioritizing the alternative strategies in an open innovation system is one of the core inputs of Food Valley. The process of achieving open innovation in Food Valley is accelerated by combining most strategies (such as trust creation, creating joint professional workgroups in food companies and having cooperation contracts for exchanging skilled workforce and sharing information, and developing continuous relationships with scientific centers and academia). Furthermore, these strategies are significantly strengthening the networking possibilities of Food Valley in agri-food industries.

To conclude, the results of this study confirmed that the 17 identified strategies provide the foundation for creating a Food Valley in Iran. It should be kept in mind that launching and establishing a Food Valley requires an all-out focus on the strategies; because strategies are

formed by combining strengths, weaknesses, threats, and opportunities. In other words, each strategy considers part of the prerequisites for creating Food Valley.

The future directions are represented by the need to create a comprehensive context inspired by sustainable development goals. Policymakers should consider applied strategies to establish Food Valley and rethink their agri-food systems according to the sustainable development goals. Furthermore, it provides more opportunities for scholars and managers of food industries to integrate within their agri-food business sustainable development goals to improve their innovative system and competition process through positive effects on Food Valley. Iranian policymakers should provide policies that support Iranian agri-food industries and SMEs and improve their infrastructure to help them integrate with other industries.

This research has some limitations. This study only focuses on the factors that led to the establishment of Food Valley in Iran. The results may only be generalized to other similar regions. Future studies exploring and comparing food system innovation initiatives and practices in other countries facing similar conditions to Iran would provide valuable benchmarks and best practices that can be adapted and applied in the Iranian context. Another limitation was that few experts in the field of open innovation and Food Valley in Iran and this study only considers the opinions of experts in the field of entrepreneurship and the food industry, and the opinions of other stakeholders, such as farmers, food producers, consumers, and local groups, are not considered. Therefore, future research could conduct surveys or interviews with the aforementioned stakeholders would provide a more comprehensive understanding of the challenges and opportunities in implementing open innovation in the food industry in Iran. Furthermore, exploring the perspectives of farmers, food producers, and consumers would shed light on their needs and expectations regarding establishing Food Valley processes and help to tailor strategies accordingly. Also, involving local groups such as associations, cooperatives, and governmental organizations would contribute to developing a holistic approach toward open innovation in the food sector. These groups can offer valuable insights into the local context, existing networks, and potential barriers that need to be addressed. Therefore, future research could solve this challenge by engaging more experts from other countries with similar conditions. Finally, this study mainly considers the current situation and does not consider future developments and changes in the agri-food sector. Therefore, it is essential for researchers and policymakers to continuously assess and analyze future developments and changes in the agri-food sector. This will enable them to develop proactive strategies and policies that can foster sustainable growth and address any potential challenges that may arise.

Implication for Theory and Practice

Various implications have been provided in this study. Theoretically, this study provides a structured approach to the feasibility of creating a network of Food Valley and identifying potential opportunities and challenges. Moreover, the theoretical evolution of related research trends such as; economic density and development will have great applications in forming future research trends.

First, the establishment of a Food Valley can create an opportunity for testing and modifying economic theories development which are related to cluster theories. Cluster theory divides industries and companies into different clusters based on their common resources such as; expert workforce, infrastructures, professional suppliers, and knowledge partners. By creating the clusters, companies would be able to cooperate and share their knowledge and ideas which will result in an increase in innovation and productivity in that cluster. Cluster theory applies to different economic development strategies to promote regional growth and competitiveness (Vicente, 2018).

Second, the Food systems theory is a multi-faceted framework that consists of different components and evaluates related activities of production, process, distribution, preparation, and consumption of foods. This theory verifies the role of food producers, consumers, businesses, local groups, and governments in food systems (Muzerengi et al, 2021). According to this theory, food innovations such as Food Valley can be considered as a solution to many food-related problems like improving the availability of local and fresh foods and supporting local farmers which can provide experimental evidence and insight into the establishment of more flexible and sustainable food systems.

Third, It is crucial to consider innovation theory in food systems to be aware of the challenges and complexities of sustainable agriculture and food systems (Jia, 2021). Reviewing innovation systems in this area would identify key elements such as; factors, knowledge and learning processes, interaction mechanisms, and context factors which would finally lead to a better understanding of innovation in agri-food systems (Spendirup & Fernqyist, 2019). Food Valley can play the role of innovation poles of the importance of implication of innovation and evolution in in food system which can bring researchers, entrepreneurs, and industry players together to be able to promote technological progress, product development, and process improvement.

The outputs of this research are relevant to the agri-food industry as they offer innovative practices that can develop product quality. This study create a new approach in the form of a Food Valley for the agri-food industry that focuses on open innovation. The combination of

agri-food industries and SMEs in the form of a Food Valley reveals how implementing an open innovation strategy can help agri-food industries adapt to regional political and market situations and apply best business practices to survive in society. It could abet the agri-food industry and SMEs to combine with other firms to highlight the importance of Food Valley as a paradigm and an efficient and effective system to improve open innovation and activities development. Therefore, the agri-food industry and SMEs can be vastly benefited in this regard by combining and using open innovation. Furthermore, policymakers could design special plans to promote strategies for launching and establishing Food Valley and the adoption of open innovation by the agri-food industries and SMEs and emphasize the effects of this paradigm to improve innovative products and services.

References

Adenle, A. A., Wedig, K., & Azadi, H. (2019). Sustainable agriculture and food security in Africa: The role of innovative technologies and international organizations. *Technology in Society*, *58*, 101143. https://doi.org/https://doi.org/10.1016/j.techsoc.2019.05.007

Akbari, M., Foroudi, P., Shahmoradi, M., Padash, H., Parizi, Z. S., Khosravani, A., Ataei, P., & Cuomo, M. T. (2022). The Evolution of Food Security: Where Are We Now, Where Should We Go Next? *Sustainability*, *14*(6), 3634. https://doi.org/10.3390/su14063634

Akbari, M., Fozouni Ardekani, Z., Pino, G., Valizadeh, N., Karbasioun, M., & Padash, H. (2023). Consumer Attitude towards Genetically Modified Foods in Iran: Application of Three-Dimensional Model of Corporate Social Responsibility. In *Foods* (Vol. 12, Issue 7). https://doi.org/10.3390/foods12071553

Akbari, M., Mahavarpour, N., Moshkdanian, F., & Maroufkhani, P. (2023). Modeling adoption of genetically modified foods: Application of Rough Set Theory and Flow Network Graph . In *Frontiers in Sustainable Food Systems* (Vol. 6). https://www.frontiersin.org/articles/10.3389/fsufs.2022.992054

Bayona-Saez, C., Cruz-Cázares, C., García-Marco, T., & Sánchez García, M. (2017). Open innovation in the food and beverage industry. *Management Decision*, *55*(3), 526–546. https://doi.org/10.1108/MD-04-2016-0213

Bigliardi, B., & Filippelli, S. (2022). A review of the literature on innovation in the agrofood industry: sustainability, smartness and health. *European Journal of Innovation Management*, *25*(6), 589–611. https://doi.org/10.1108/EJIM-05-2021-0258

Bogers, M., Chesbrough, H., & Strand, R. (2020). Sustainable open innovation to address a grand challenge: Lessons from Carlsberg and the Green Fiber Bottle. *British Food*

Journal, *122*(5), 1505–1517. https://doi.org/10.1108/BFJ-07-2019-0534

Boratyńska, K., & Huseynov, R. T. (2017). An innovative approach to food security policy in developing countries. *Journal of Innovation and Knowledge*, *2*(1), 39–44. https://doi.org/10.1016/j.jik.2016.01.007

Dabic, M., Hjortsø, C. N., Marzi, G., & Vlačić, B. (2022). Guest editorial: Open innovation in the food industry: what we know, what we don't know, what we need to know. *British Food Journal*, *124*(6), 1777–1785. https://doi.org/10.1108/BFJ-06-2022-029

Dong, H., Liu, Z., Kong, K., Li, T., & Ma, Q. (2021). Evaluation of Input-Output Efficiency of Sports Industry Based on SWOT-PEST Model. *Journal of Mathematics*, *2021*, 1–11. https://doi.org/10.1155/2021/6294745

FAO, IFAD, UNICEF, W. and W. F. P., & WHO. (2022). In Brief to The State of Food Security and Nutrition in the World 2022. In *FAO(Food and Agriculture Organization of the United Nations)*. https://doi.org/10.4060/cc0640en

FAO. (2020). Climate change and food security. *Agriculture and Forestry*, *66*(3), 197–210. https://doi.org/10.17707/AgricultForest.66.3.16

Fortes, A. R., Ferreira, V., Simões, E. B., Baptista, I., Grando, S., & Sequeira, E. (2020). Food systems and food security: The role of small farms and small food businesses in Santiago Island, Cabo Verde. *Agriculture (Switzerland)*, *10*(6), 1–30. https://doi.org/10.3390/agriculture10060216

Fritz, M., & Schiefer, G. (2009). System dynamics and innovation in food networks. *British Food Journal*, *111*(8), 20–31. https://doi.org/10.1108/bfj.2009.070111haa.001

Gross, M. (2022). Global food security hit by war. *Current Biology*, *32*(8), R341--R343.

Hao, Z., Zhang, M., Liu, K., Zhang, X., Jia, H., & Chen, P. (2022). Where Is the Way Forward for New Media Empowering Public Health? Development Strategy Options Based on SWOT-AHP Model. *International Journal of Environmental Research and Public Health*, *19*(19), 12813. https://doi.org/10.3390/ijerph191912813

Li, D., Wang, W., Huang, G., Zhou, S., Zhu, S., & Feng, H. (2023). How to Enhance Citizens' Sense of Gain in Smart Cities? A SWOT-AHP-TOWS Approach. In *Social Indicators Research* (Vol. 165, Issue 3). Springer Netherlands. https://doi.org/10.1007/s11205-022-03047-9

Meneguel, C. R. de A., Hernández-Rojas, R. D., & Mateos, M. R. (2022). The synergy between food and agri-food suppliers, and the restaurant sector in the World Heritage City of Córdoba (Spain). *Journal of Ethnic Foods*, *9*(1), 11.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded*

sourcebook. sage.

Noorani, N., Zamani, A., Alenezi, M., Shameem, M., & Singh, P. (2022). Factor Prioritization for Effectively Implementing DevOps in Software Development Organizations: A SWOT-AHP Approach. *Axioms*, *11*(10), 498. https://doi.org/10.3390/axioms11100498

Nyamah, E. Y., Jiang, Y., Feng, Y., & Enchill, E. (2017). Agri-food supply chain performance: an empirical impact of risk. *Management Decision*, *55*(5), 872–891. https://doi.org/10.1108/MD-01-2016-0049

O'Hara, S., & Toussaint, E. C. (2021). Food access in crisis: Food security and COVID-19. *Ecological Economics*, *180*, 106859. https://doi.org/https://doi.org/10.1016/j.ecolecon.2020.106859

Omta, S. W. F., & Fortuin, F. T. J. M. (2013). Effectiveness of cluster organizations in facilitating open innovation in regional innovation systems: The case of Food Valley in the Netherlands. In *Open Innovation in the Food and Beverage Industry*. Woodhead Publishing Limited. https://doi.org/10.1533/9780857097248.2.174

Ortiz-Miranda, D., Moreno-Pérez, O., Arnalte-Mur, L., Cerrada-Serra, P., Martinez-Gomez, V., Adolph, B., Atela, J., Ayambila, S., Baptista, I., Barbu, R., Bjørkhaug, H., Czekaj, M., Duckett, D., Fortes, A., Galli, F., Goussios, G., Hernández, P. A., Karanikolas, P., Machila, K., … Yeboah, R. (2022). The future of small farms and small food businesses as actors in regional food security: A participatory scenario analysis from Europe and Africa. *Journal of Rural Studies*, *95*(August 2021), 326–335. https://doi.org/10.1016/j.jrurstud.2022.09.006

Pontieri, P., Mennini, F. S., Magni, D., Fiano, F., Scuotto, V., Papa, A., Aletta, M., & Del Giudice, L. (2022). Sustainable open innovation for the agri-food system: sorghum as healthy food to deal with environmental challenges. *British Food Journal*, *124*(9), 2649–2672. https://doi.org/10.1108/BFJ-07-2021-0732

Sanchez, R., Reyes, B., Ramos, E., & Coles, P. S. (2023). Supplier relationship management process assessment in food supply chains: an empirical study in coffee supply chains from Peru. *International Journal of Process Management and Benchmarking*, *14*(2), 218–244.

Shamah-Levy, T., Mundo-Rosas, V., Flores-De la Vega, M. M., & Luiselli-Fernández, C. (2017). Food security governance in Mexico: How can it be improved? *Global Food Security*, *14*, 73–78. https://doi.org/10.1016/j.gfs.2017.05.004

Solarte-Montufar, J. G., Zartha-Sossa, J. W., & Osorio-Mora, O. (2021). Open Innovation in the Agri-Food Sector: Perspectives from a Systematic Literature Review and a

Structured Survey in MSMEs. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(2), 161. https://doi.org/10.3390/joitmc7020161

Troise, C., Tani, M., Dinsmore, J., & Schiuma, G. (2021). Understanding the implications of equity crowdfunding on sustainability-oriented innovation and changes in agri-food systems: Insights into an open innovation approach. *Technological Forecasting and Social Change, 171*, 120959. https://doi.org/https://doi.org/10.1016/j.techfore.2021.120959

Venturelli, A., Caputo, A., Pizzi, S., & Valenza, G. (2022). A dynamic framework for sustainable open innovation in the food industry. *British Food Journal*, *124*(6), 1895–1911. https://doi.org/10.1108/BFJ-03-2021-0293

Zarafshani, K., Rostamitabar, F., Hosseininia, G. H., Akbari, M., & Azadi, H. (2010). Are agricultural production cooperatives successful? A case study in Western Iran. *American-Eurasian Journal of Agricultural and Environmental Science*, *8*(4), 482–486.

تحلیل راهبردی ایجاد دره غذایی در ایران با استفاده از روش SWOT

عدم شناخت پتانسیل دره غذایی (Food Valley) و عدم گنجاندن نوآوری باز در استراتژی های صنایع غذایی موانع جدی است که پایداری و دوام آنها را تضعیف می کند. از روش ترکیبی برای پاسخ به این سوال استفاده شد که در تجزیه و تحلیل SWOT چه مواردی خارجی و داخلی وجود دارد تا امکان ایجاد دره غذایی در ایران ارزیابی شود. داده ها با استفاده از مصاحبه ساختاریافته با 16 نفر از کارشناسان کارآفرینی و صنایع غذایی جمع آوری شد. ماتریس SWOT بر اساس 42 عامل شناسایی شده است که در چهار دسته قوت، ضعف، فرصت و تهدید ترسیم شده است. در مجموع 17 استراتژی برای ایجاد Food Valley ارائه شد که شامل 5 استراتژی تهاجمی، 5 استراتژی تجدید نظر، 3 استراتژی تنوع و 4 استراتژی دفاعی بود. نتایج نشان داد که اعتمادسازی، ایجاد کارگروه های تخصصی مشترک در شرکت های مواد غذایی، داشتن قراردادهای همکاری برای تبادل نیروی کار ماهر، به اشتراک گذاری اطلاعات، توسعه روابط مستمر با مراکز علمی و دانشگاهی از مهم ترین راهکارهای ایجاد دره غذا در ایران است. اولویت‌بندی استراتژی‌های جایگزین نشان داد که از آنجایی که Food Valley یک عامل مهم در زمینه امنیت غذایی است، این مطالعه به ادبیات امنیت غذایی کمک می‌کند. سیاست‌گذاران می‌توانند برنامه‌های ویژه‌ای برای ارتقای استراتژی‌هایی برای راه‌اندازی و ایجاد Food Valleyو پذیرش نوآوری باز توسط صنایع کشاورزی-غذایی و SMEs طراحی کنند و بر تأثیرات این پارادایم برای بهبود محصولات و خدمات نوآورانه تأکید کنند.