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The Strategy of Contract Farming Development: An Iranian Experience

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Original Research

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Abstract:

Contract farming is considered a vital approach to overcoming some of the major challenges in Iran's agricultural sector and transforming farmers' economic conditions. It serves as an institutional mechanism for transitioning traditional agriculture toward a commercial model. This study aims to develop a strategy for the sustainable development of contract farming. To this end, 45 experts—including sponsor company managers and experienced farmers—were randomly selected from an FAO-approved contract farming company in a western province of Iran to identify internal and external success factors. The Analytic Network Process (ANP) was used within a SWOT matrix to prioritize these factors. The results indicated that the strengths and weaknesses of the sponsor company were the most influential in the development of contract farming. Specifically, in tomato contract farming in Kermanshah, strengths had a relative weight of 0.34 and weaknesses 0.29, highlighting their critical role. Addressing weaknesses and reinforcing strengths is thus key to promoting contract farming. Among the strengths, trust between farmers and sponsors (weight: 0.06) had the greatest impact, while among the weaknesses, limited access to collateral (weight: 0.01) was the most significant. Therefore, a focused strategy grounded in the SWOT framework—rather than a generalized approach—is essential for advancing contract farming.

Keywords: Contract Farming, Tomato, ANP, SWOT.

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INTRODUCTION

Contract farming is recognized as a key solution for addressing challenges in agribusiness (Meemken & Bellemare, 2020). In response to its growing significance, the Food and Agriculture Organization (FAO) published a book in 2001 titled *Contract Farming: Partnerships for Growth*, emphasizing the role and impact of contract farming in both developed and developing countries. According to FAO, the expansion of contract farming

benefits agribusiness at various scales by reducing production costs and facilitating the commercialization of smallholder farming (FAO, 2001). This publication has played a critical role in accelerating the adoption of contract farming policies globally (Ray et al., 2021).

Contract farming is a formal or informal agreement between farmers and sponsor companies, under which farmers commit to producing specified products over a defined period (Forrest Zhang, 2012). FAO defines it as an arrangement that establishes the necessary infrastructure

for production and marketing through cooperation between farmers and sponsors (FAO, 2001). It serves as a mechanism to connect smallholders to markets, reduce transaction costs, and enable sponsor companies to engage in production and oversight without owning land or managing farm operations (Key & Runsten, 1999; Mishra et al., 2016; Baumann, 2000). Reliable access to quality production inputs is essential for successful agribusiness in both domestic and international markets; thus, modern agriculture increasingly relies on contract farming to enable specialized production (Singh, 2002).

In developing countries, agriculture plays a critical role in ensuring food security, generating employment, and driving economic growth. However, the sector faces persistent challenges such as limited investment, low technological adoption, poor productivity, dominance of small-scale farms, and inefficient supply chains—factors that collectively raise production costs (Bakhshaiesh et al., 2020). Contract farming offers a viable strategy to mitigate these issues. From an institutional economics perspective, it contributes to rural development by enhancing farmer incomes and improving market structures (Key & Runsten, 1999). In many developing contexts, contract farming facilitates the production of higher-quality and higher-value crops (Ma et al., 2011; Ragasa et al., 2018), promotes technology transfer, and boosts overall productivity (Barrett et al., 2012). For example, Behera and Swain (2021) found that contract farmers in Bihar, India, achieved higher yields and lower production costs due to improved access to land and seeds. Similarly, Patel (2022) reported that tomato contract farming in India reduced production risks and costs. Bellemare (2021) highlighted farmer training as the most influential factor in cotton contract farming adoption across Asia. In Tanzania, Simbila (2020) showed that land consolidation under contract farming lowered palm oil production costs and increased yields. In Vietnam's

Mekong Delta, the expansion of rice contract farming under the “small farmers, big farm” initiative spurred farm-level investment and created a more efficient value chain (Nguyen et al., 2019). Khan et al. (2019) concluded that potato contract farming enhanced farmers' income, productivity, and demand for skilled labor.

Despite strong international support, contract farming in Iran remains at an early and limited stage. However, in 2021, its expansion was identified as a priority by agricultural policymakers. This study aims to identify key factors for establishing a successful contract farming framework. Using structured interviews, data were collected from sponsor company experts and participating farmers. The Analytic Network Process (ANP) was employed to prioritize the identified factors and sub-factors. A SWOT matrix was then applied to categorize these factors and guide the development of a strategic contract farming model.

METHODOLOGY

Case study description

Descriptive statistics in Table 1 show that the average tomato farm size in Kermanshah is 1.8 hectares, with farmers owning the land. During the harvest season, over 2,600 seasonal workers are employed by the sponsor company. Approximately 50% of the tomato production is supplied to the domestic market, while the rest is exported as tomato paste and aseptic products. In 2020, the sponsor company's exports totaled \$23 million, with key destinations including Canada, China, Italy, Russia, the United Kingdom, Ghana, the United Arab Emirates, and Iraq.

The sponsor company supplied production inputs—such as high-quality seeds, fertilizers, and pesticides—on time and provided farmer training. Additionally, up-to-date research findings were shared with farmers via social

Table 1. The Complementary Information about the Production of Tomatoes the Contracted Farmers.

Variable	Unit	Quantity
Cultivated area	ha	4571
Average of cultivated area per farm	ha	1.8
Number of contracts	Number	2501
Tomato production	Thousand Tons	252.8
Average yield (OP seed)	Tons	70
Average yield (hybrid seed)	Tons	101.7
Average water consumption (OP seed)	m ³ /ha	9590
Average water consumption (hybrid seed)	m ³ /ha	9865
Share of pressurized irrigation in Farms	percent	95
Tomato price	\$	0.07
Average of production cost per hectare	\$	351
Average of production revenue per hectare	\$	714
Average of production profit per hectare	\$	363

media and smartphones at no extra cost. Input costs were deducted from farmers' revenue post-harvest. According to national agricultural statistics, the average tomato yield is 42.5 tons/ha. In comparison, contracted farms using OP and Canadian seeds achieved average yields of 70 and 102 tons/ha, respectively. Water use in contracted farms was 9,590 m³/ha, compared to 10,700 m³/ha in non-contracted farms. Further production details for contracted farms are presented in Table 1.

Multiple studies and expert insights highlight a range of internal factors from both sponsor companies and farmers that influence the success of contract farming in the region. Additionally, several external and uncontrollable factors—such as government-imposed tomato pricing—significantly affect outcomes. In the initial phase of the study, internal variables linked to sponsors and farmers, as well as external factors at regional, national, and international levels, were identified. These were then classified into strengths, weaknesses, opportunities, and threats through SWOT analysis, forming the foundation for developing a contract farming success strategy. The Analytic Network Process (ANP) was used to assign weights to the identified variables, determining their relative importance within each SWOT dimension and the strategy development process. Based on these results, targeted strategies were formulated using the SWOT framework.

ANP

The Analytic Network Process (ANP) is a comparative measurement method that uses absolute scales to evaluate both tangible and intangible criteria based on expert judgment. It simplifies complex, multi-dimensional problems into a one-dimensional format, thereby streamlining the decision-making process by reducing influencing variables (Saaty, 2005). This approach yields either a single value representing the optimal outcome or a priority vector that ranks the possible alternatives (Kurttila et al., 2000).

The ANP follows a four-step procedure as follows:

Step 1. Model construction and problem structuring: First, the problem should be clearly stated and presented in a logical system as a network (Saaty, 2005).

Step 2. Pairwise comparison matrices and priority vectors: The qualitative judgment about different criteria in different clusters should be expressed numerically for the pairwise comparison. To this end, experts must make a reciprocal pairwise comparison scientifically (Thangamani, 2012).

The pairwise comparisons are structured in a matrix format. The priority vector, representing the relative importance of criteria on a ratio scale, is derived as the principal eigenvector of the matrix. To calculate the eigenvector ($\lambda_{\max}W$), the elements of each column are first summed, and each matrix element is divided by its respective column total. The average of the normalized row elements is then computed to obtain the eigenvector (Kassem et al., 2020). The relative weights (w) of the matrix (a) are obtained from the following equation:

$$AW = \lambda_{\max} W \quad (1)$$

where A is a matrix of pairwise comparison, W is a vector of weights, and $\lambda_{\max}W$ is the maximum value of Matrix A .

Priority vectors should be calculated for all pairwise comparison matrices, and the consistency ratio (CR) should be obtained for each of them. The matrix is consistent and acceptable if $CR \leq 0.1$. If the consistency ratio is higher than 0.1, the process is repeated, and a reasonable value of the consistency rate is obtained (Saaty, 2005). The CR is calculated from Eq. (2):

$$C.R = CI/RI \quad (2)$$

where CI is a consistency index obtained from the equation below:

$$CI = \lambda_{\max} - n / (n - 1) \quad (3)$$

Step 3. Supermatrix formation: The priorities derived from pairwise comparisons are organized vertically and horizontally according to clusters in the unweighted supermatrix. Each comparison yields a priority vector, which forms a column within the supermatrix (Yuksel & Dagdeviren, 2007). The supermatrix is a partitioned matrix, where each segment represents the influence between two clusters within the system. The weighted priorities from the cluster priority matrix are then used to adjust the corresponding block of column priorities in the supermatrix, reflecting the influence of one cluster on another. This is done for all clusters to produce the weighted supermatrix (Meade & Sarkis, 1999). The final step involves calculating the limit supermatrix by raising the weighted supermatrix to the power of $2k+1$, where k is a sufficiently large number. The resulting limit supermatrix has uniform columns, and the final priorities of all elements are obtained by normalizing each cluster within this matrix (Yuksel & Dagdeviren, 2007).

Step 4. Selecting the best alternative: When the supermatrix encompasses the entire network, the priority weights of the alternatives are found in the alternatives' column of the normalized supermatrix. However, if the supermatrix includes only interrelated clusters, further calculations are required to determine the overall priorities of the alternatives (Yuksel & Dagdeviren, 2007).

SWOT

The SWOT matrix is an analytical tool used to systematically identify internal factors—Strengths and Weaknesses—and external factors—Opportunities and

Threats. It is commonly applied to assess an organization's current situation. Internal analysis focuses on identifying resources, capabilities, and competitive advantages within the organization, while external analysis examines market opportunities and threats by considering competitors, the sector, and the broader environment (Harish, 2020). Strengths are internal factors that positively influence organizational performance, whereas weaknesses are internal factors that may hinder it. Opportunities refer to external potentials that can foster development, while threats are external challenges that may cause disadvantages (Hill & Westbrook, 1997). The aim of SWOT analysis is to leverage insights about internal and external environments to guide strategic planning (Pickton & Wright, 1998). Initially, a comprehensive list of strengths, weaknesses, opportunities, and threats is generated by analyzing these environments to identify key criteria, after which the most suitable strategy is selected from various alternatives.

The empirical model

This study employed SWOT analysis to identify key variables that create favorable conditions for the successful development of contract farming (Erjavec et al., 2018; Harish, 2020; Kassem et al., 2020). Data were collected from "Rojin Tak," a contract farming company approved by the FAO, located in Kermanshah, a western province of Iran. A questionnaire was completed by 45 experts, including sponsor company managers and experienced farmers, to extract region-specific variables.

The Rojin Tak Complex's contract farming initiative is supported by the FAO in Iran and aligns with international contract farming standards. Questionnaires were administered to all 10 qualified experts within the sponsoring company and, with consent, distributed to 35 farmers, constituting the study's participant group. Fig.1 depicts the empirical framework of the study.

Figure 1 illustrates the SWOT matrix's four dimensions, divided into internal and external factors. Acknowledging the roles of both contracting parties, the study identified key variables from sponsors and farmers and assessed their significance in the success of contract farming.

RESULTS AND DISCUSSION

The data were analyzed at three levels: macro, intermediate, and micro. Figure 3 presents the overall analysis and initial SWOT stage, while Figure 2 shows the intermediate-level analysis. Table 2 details the micro-level analysis and the third research phase.

Table 4 displays the criteria and their weights across all three levels. At the micro-level, the highest weight was assigned to the presence of bilateral trust between farmers and the sponsor company, identifying it as the most influential factor for contract farming development. Purchasing at prices above the support price was a key strength of the sponsor company.

Significant weaknesses included farmers' lack of valid bank collateral and delays in farmers' payments, as noted by both farmers and company experts, hindering contract farming progress. Among regional opportunities, access to high-yield, costly hybrid seeds received the highest weight. At national and international levels, export potential to neighboring countries like Iraq and Turkey was the most impactful opportunity. The third-level analysis reaffirmed bilateral trust and flexibility in farmers' bail-in gains as the top criteria for contract farming development. Conversely, neglect of Orobanchaceae was identified as the most critical regional threat.

Figure 3 presents the weights of the second-level SWOT criteria. The sponsor company's strengths (0.6) had a greater impact than the farmers' strengths (0.4). For weaknesses, the sponsor company's weaknesses (0.86) were more influential than those of the farmers (0.14). In the opportunities category, national and international opportunities (0.8) outweighed regional opportunities (0.2). Conversely, regional threats (0.76) had a stronger negative effect on contract farming development than national and international threats.

The results indicate that strengths, with a weight of 0.34, were the most influential regional factor in contract farming development. Weaknesses followed with a weight of 0.29. Threats and opportunities had weights of 0.24 and 0.13, respectively. Therefore, contract farming development strategies should primarily focus on strengths and threats.

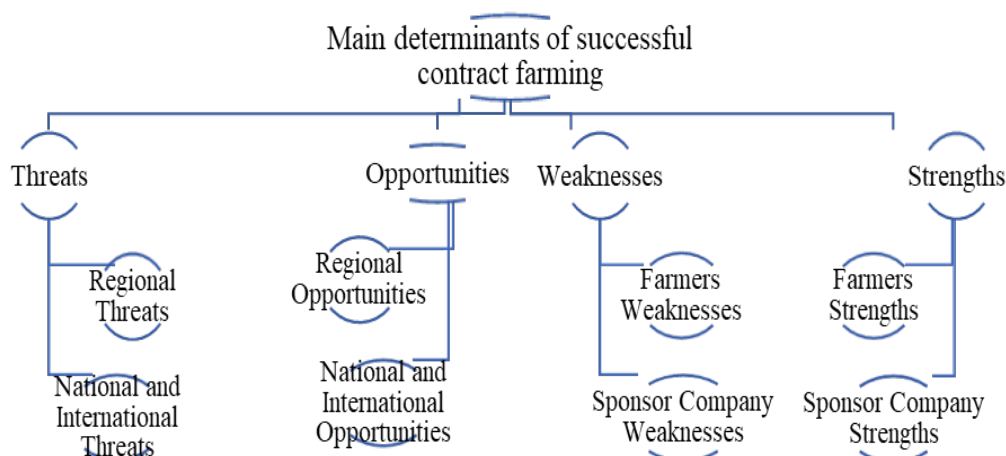


Figure 1. The Empirical Framework of Tomato Contract Farming in Kermanshah Province.

Table 2. The SWOT Criteria and Their Relevant Weights.

Criteria	First level	Second level	Third level
Strengths	0.337		
Farmer's strengths		0.4	
Bilateral trust between farmers and the sponsor company			0.0623
Suitable access to production inputs through sponsor company			0.0356
Low risk of signing the contract with the sponsor company			0.0354
Existence of pressurized irrigation facilities			0.0312
Using the hybrid seeds with the higher yield			0.0265
Suitable access to training courses			0.0203
Positive experience of farmers from contract farming			0.0199
Sponsor company's strengths		0.6	
Purchasing based on market price and not lower than the support price			0.0935
Providing training program for farmers			0.0549
Price determination higher than the break-even point			0.0364
Possessing research facilities for increasing farmers' productivity			0.0338
Low transaction costs			0.0124
Informing the farmers through the social media			0.0116
Weaknesses	0.291		
Farmer's weaknesses		0.142	
Lack of access to bail			0.0134
Lack of access to low-cost loan			0.0107
Resistance to the adaptation of modern cultivation method			0.0037
Lack of adherence to contract			0.0029
Family or social disagreements			0.0024
Sponsor company's weaknesses		0.857	
delay in the farmer's payments			0.0808
Selling the products to competeters			0.0213
High infrastructure costs			0.0194
Lack of production insurance			0.0108
Opportunities	0.127		
Regional opportunities		0.198	
Existence of hybrid seeds			0.0088
Support of regional government institute			0.0033
Rich soil, access to water, and suitable climate condition			0.0028
Access to the young labor force			0.0025
Suitable condition for second-season cultivation			0.0025
National and international opportunities		0.801	
Possibility of export to neighboring countries			0.0354
Support of Minister of Agriculture			0.0099
High per capita consumption of tomato paste			0.0064
Proximity to tropical regions			0.0041
Threats	0.243		
Regional threats		0.758	
Lack of attention to Orobanchaceae			0.0675
Tomato price fluctuation			0.0511
The incapability of insurance company			0.0330
Low awareness of farmers and government about the contract farming			0.0265
Lack of contract farming in surrounding areas			0.0251
National and international threats		0.241	
Exchange rate fluctuation and information asymmetry			0.0215
High production costs due to expensive exchange rate and high inflation rate			0.0146
Lack of timely payment of funds for the implementation of government support			0.1150
Occasional bans on exports to Iraq			0.0069
Lack of foreign investors due to sanctions			0.0057
Inaccessibility to domestic hybrid seeds			

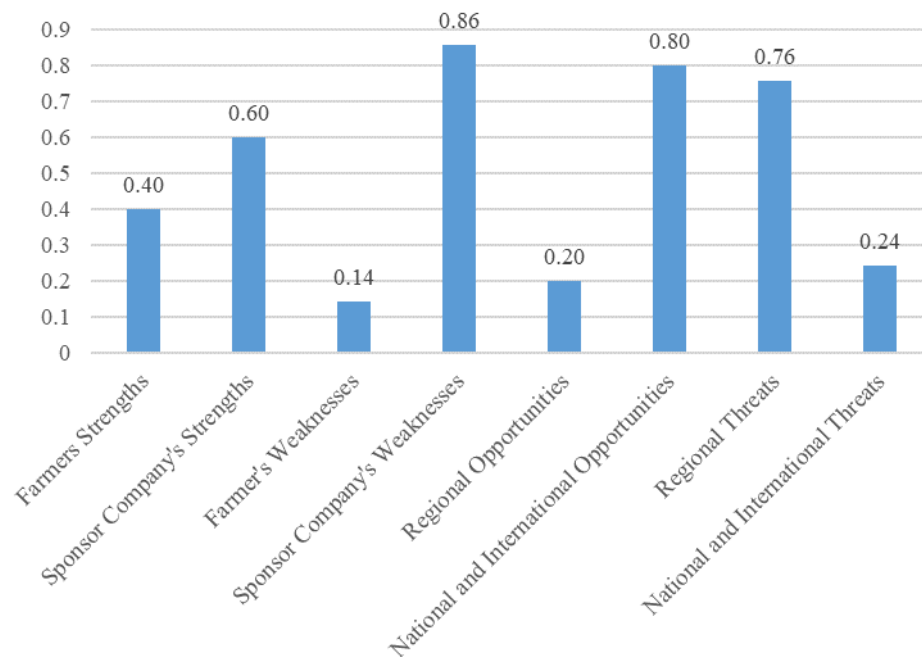


Figure 2. The Weights of the Second-level Criteria in the SWOT Analysis.

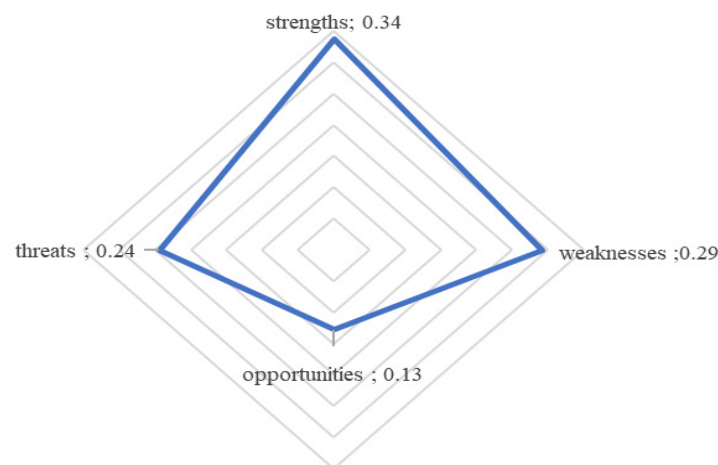


Figure 3. Different Dimensions of SWOT and Their Wights at the First Level.

Figure 2 presents the weights of the SWOT dimensions. Based on the ranking of variables within each SWOT dimension, four strategies—SO, OW, ST, and SW—were selected according to the highest weights in their respective categories. These strategies were then developed by combining the SWOT dimensions. The main strategies derived from the SWOT matrix are presented in Figure 4.

Conclusion and policy implication

Contract farming is a key framework for agricultural development. This study ranked and prioritized its main determinants. The results showed that using higher-yield hybrid seeds, rising production costs due to high inflation and exchange rates, low awareness of contract farming among farmers and government, availability of research facilities to improve productivity, and farmer training are

the most significant factors enhancing contract farming development. Overall, expansion requires addressing physical, economic, social, technical, and educational elements.

Contract farming is multi-sectoral and multi-dimensional, needing a comprehensive development plan in Kermanshah that includes technical, economic, legal, educational, cultural, and ecological aspects. Focusing solely on agricultural traits may lead to failure. Policymakers must recognize all dimensions and provide technical support through government and sponsor company research and development, such as improved seeds and pest control. Creating a credit line between financial institutions, sponsor companies, and farmers is a vital policy measure, ensuring resources for purchasing farmers' products and timely procurement of production inputs, which boosts productivity. Organizing farmer training programs is a

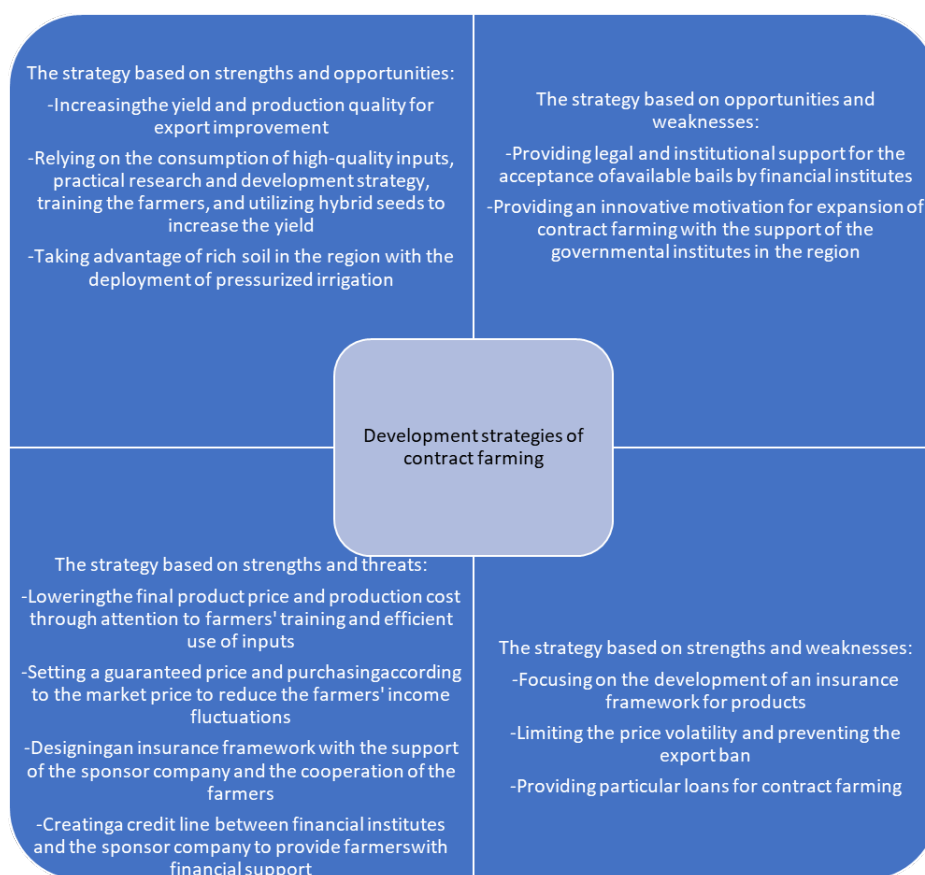


Figure 4. The Main strategies for Contract Farming Development in Kermanshah Province.

major strength of sponsor companies and essential for success. Additionally, adopting hybrid seeds and modern irrigation technologies should be prioritized in sponsor company agendas.

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AUTHOR CONTRIBUTIONS

Hossein Hossein Abadi: Writing– Original draft, formal analysis, analysis and interpretation of results. Amir Mohammadi Nejad: Writing–original draft, Writing review and editing, project administration, analysis and interpretation of results. Omid Gilanpour: Validation, consulting and supervision on data collection, methodology, analysis and interpretation of results. Mohamad Khaledi: consulting and supervision on data collection, methodology.

CONFLICTS OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author, A. M. Mohammadi Nejad, upon reasonable request.

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