Identifying Priority Strategies for Entrepreneurial Development in the Poultry Industry: Evidence from Mashhad, Iran

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5 ABSTRACT

6 The increasing demand for food, especially poultry products, highlights critical challenges

- 7 to food security. In this context, agricultural entrepreneurship in the poultry sub-sector plays a
- 8 vital role in addressing these challenges by enhancing food supply and contributing to economic
- 9 growth and development. This study specifically focuses on fostering entrepreneurship within
- 10 the poultry industry in Mashhad, emphasizing its pivotal role in Iran's economy and its
- 11 contribution to food security. Using an exploratory research method along with SWOT and
- 12 Ordinal Priority Approach (OPA) analysis, 18 factors influencing entrepreneurship in the 13 poultry industry were identified and weighted, leading to the development and ranking of 14
- 14 strategies. The results indicate that strategies such as transferring the tasks related to the poultry
- industry from the government to the private sector (SO) and using the capacities of knowledgebased companies for innovation in the supply of poultry input (WT) have the highest scores. In
- contrast, strategies such as organizing workshops and training courses (WO) and hiring skilled
 labore (ST) have lower scores. The findings suggest practical concepts for poultry
- entrepreneurs, including branding, technology adoption, establishing international animal welfare standards, collaborating with knowledge-based companies, and privatization under government supervision. These strategies can foster regional development by promoting entrepreneurship, which in turn can increase employment, economic growth, and productivity, ensuring a balanced distribution of opportunities and resources.
- Keywords: Ordinal Priority Approach, Regional Development, Strategic Analysis, SWOT,
 Entrepreneurship.

INTRODUCTION

The dynamic prospects of economic development, increasing population growth, global food demand, and rising income levels have intensified the need for sustainable solutions in the agricultural sector (Tilman *et al.*, 2011). This growth in population and income not only

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31 heightens food consumption but also presents challenges to food security and sustainable 32 development processes (Molotoks et al., 2021; Erdaw and Beyene, 2022). Thus, balancing the 33 rising demand for food with long-term sustainable development is essential (Bijl et al., 2017). As the agricultural sector serves as the cornerstone of any nation's economy (World Bank, 34 35 2016), it plays a crucial role in ensuring food security and sustainable development (Pawlak 36 and Kołodziejczak, 2020). A self-sufficient agricultural sector allows resources to be directed 37 toward infrastructure and other areas critical to economic growth, while dependence on food 38 imports can delay the process of sustainable development (Ali et al., 2021, Mohammadi and 39 Saghaian, 2022). In Iran, agriculture is a major economic sector, accounting for approximately 40 10% of GDP and 15% of total employment (Statistical Centre of Iran, 2021). It not only supplies 41 food, raw materials, and investment for sustainable economic growth (Kleyn and Ciacciariello, 42 2021), but also serves as the foundation for rural development, supporting income generation, 43 employment, and industrial activities. (Zecca and Bataineh, 2016). Among the vital sub-sectors 44 in Iran's agriculture is the poultry industry, which has transformed from traditional farming 45 practices to a significant player in agricultural production and employment, largely due to 46 substantial capital investment (Zaghari, 2018). The poultry industry contributes to food 47 security, employment, poverty reduction, and economic growth(Shoofiyani et al., 2022), 48 providing around 60% of the per capita animal protein intake through chicken meat and eggs 49 in Iran (Zaghari, 2018).

50 Despite the substantial role of the poultry industry in food security and economic stability, 51 it faces significant challenges in Iran (Rahimi, 2013). One of the primary issues is the high cost 52 of poultry feed combined with government price controls on poultry meat, aimed at consumer 53 price support (Zamani et al., 2019). While these price controls benefit consumers, they reduce the profitability and incentives for poultry producers, ultimately impacting production levels 54 55 (Mohammadi *et al.*, 2023). This gap between the current constraints in the industry (high costs 56 and limited incentives) and the desired state of a thriving, self-sustaining poultry sector that 57 fosters growth and innovation represents a critical problem (Mottet and Tempio, 2017). Addressing this gap requires strategic interventions that enhance producer incentives and foster 58 59 an environment conducive to entrepreneurial activities (Simonov and Girfanova, 2023). Entrepreneurship is crucial in overcoming these challenges and exploiting potential 60 opportunities within the poultry industry (Lin et al., 2021). Agricultural entrepreneurship, 61 defined as the strategic pursuit of market opportunities to initiate and expand business activities 62 63 (Jafari-Sadeghi et al., 2021), is particularly important in modernizing the poultry sector.

One of the most important goals of entrepreneurship development in agriculture is to modernize agricultural structures and create of a new agricultural environment for job creation (Gholamrezai *et al.*, 2021). In general, Agricultural entrepreneurship, accompanied by the risks of the agricultural sector, creates avenues for employment, increased income, enhanced quality of life, and greater individual participation in the economy. (Mohammadi *et al.*, 2017). An entrepreneurial farmer interprets challenges and environmental changes as opportunities and uses the existing resources to produce new products or services (Aliabadi *et al.*, 2016).

71 Given the critical role of opportunity recognition in the entrepreneurial process and its 72 potential to advance and strengthen entrepreneurship (Rosca et al., 2020), it is essential to 73 identify and implement effective strategies for entrepreneurial development in agricultural sub-74 sectors, including the poultry sector, to achieve an optimal level and position in entrepreneurship. In this context, the present study explores the landscape of entrepreneurship 75 76 in agriculture, with a specific focus on the poultry industry. By examining the challenges and 77 opportunities within this sector, it aims to provide insights for the development of effective 78 entrepreneurial strategies. agricultural entrepreneurship has been investigated in numerous 79 studies.

80 **Table 1.** Literature on agricultural entrepreneurship. Author Area of study The goal of the study Methodology Results Pindado and Europe Analysing Entrepreneurial random effects Newcomers in agriculture tend to lean Sánchez (2017) Behaviour in New and logit models more towards entrepreneurship compared Investments to individuals with more prior agricultural Existing in European Agriculture. experience. Choudhury and Brahmaputra Examining Factors Qualitative Human resources with limited knowledge the Agricultural Easwaran Valley, Assam Influencing Analysis and and awareness, market facilities, and most (2019)(India) Entrepreneurship Mean importantly, supply and demand, serve as in the agricultural Brahmaputra Valley, Assam. Decomposition constraints in entrepreneurship development. Analysis Martinho (2020) European Union Entrepreneurship Policy tools play a significant role in Exploring Descriptive Data Dimensions Analysis entrepreneurship, so it is essential to in European and Union Agriculture Towards a Cobb-Douglas enhance the mutual relationship between More Sustainable Sector. Model-Based agricultural policies and entrepreneurship. Regressions. Moreover, in agricultural entrepreneurship, economic aspects are pivotal. Regmi Nepal Evaluating Factors SWOT Increasing awareness about agricultural and the Naharki (2020) Influencing Agricultural entrepreneurship, human resource Trade Entrepreneurship. development, infrastructure, government support, and establishing special export zones can contribute to harnessing the of agricultural potential trade entrepreneurship in Nepal. Gholamrezai et Iran Structural Sustainable entrepreneurship is influenced Designing а model for al. (2021) sustainable entrepreneurship Equation Model by external factors such as mindset, among domestic producers of contextual conditions like education and agricultural inputs community understanding, and intervention factors such as government support and the development of technical infrastructure

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82 Existing research (Table 1) has examined the general factors influencing agriculture entrepreneurship, exploring its dimensions and obstacles through various quantitative and 83 qualitative methods, including decision-making approaches (Regmi and Naharki, 2020), 84 85 economic analysis (Khoshmaram et al., 2019), qualitative analysis (Choudhury and Easwaran, 2019; Khosravipour and Shoeibi, 2022), correlation analysis, and structural equation modelling 86 (Gholamrezai et al., 2021). However, there is a gap in studies where previous research does not 87 88 specifically focus on entrepreneurship in a sub-sector of agriculture and generally examines the 89 agricultural sector as a whole. This study addresses this gap by focusing on entrepreneurship in 90 the poultry industry and providing strategies for its promotion based on a comprehensive 91 analysis of strengths, weaknesses, opportunities, and threats (SWOT). In other words, the 92 development of entrepreneurship in the poultry industry requires a multi-level approach that considers the macro (industry), meso (sectoral), and micro (firm) levels, as the optimal 93 implementation of many macro-level strategies necessitates their execution at both the meso 94 95 and firm levels.

96 On the other hand, it is necessary to formulate entrepreneurship development strategies 97 suitable to each region based on its unique economic, cultural, political, and climatic conditions 98 is essential. Moreover, the integration of SWOT analysis and OPA (Ordinal Priority Approach) 99 in this study represent a new approach that reveals hidden judgments, contradictions and 100 uncertainties of decision makers, which have often been neglected in previous studies. The 101 SWOT analysis is used as a valuable tool for strategic planning, enabling decision-makers to 102 assess internal and external factors crucial for effective program formulation (Vashishtha and 103 Dhawan, 2023). Simultaneously, the OPA, an advancement in Multi-Criteria Decision Making 104 (MCDM), addresses the limitations of traditional methods like WASPAS and BWM. By 105 independently estimating weights of experts, criteria, and options, OPA minimizes pairwise 106 comparisons, enhancing compatibility (Sadeghi et al., 2022).

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This study contributes to the existing literature through several innovations. First, by focusing on the poultry industry as a specific agricultural sub-sector, it addresses a research gap in entrepreneurship in small and medium enterprises within this industry. Second, the use of an integrated SWOT-OPA approach, as a novel method in multi-criteria decision-making (MCDM), enables a more comprehensive and precise identification of factors influencing entrepreneurial development. Third, all factors affecting entrepreneurship development have been identified in terms of strengths, weaknesses, opportunities, and threats, providing a better

understanding of the internal and external environments of the poultry industry. Fourth,
examining this topic in a new geographical area aids in understanding regional conditions and
their impact on entrepreneurship.

The structure of this study is organized as follows: Section 2 reviews and explains the theoretical foundations. Section 3 focuses on the research methodology, while Section 4 presents the results and discussion. Finally, the conclusion is provided in the last section, including recommendations and key insights for fostering entrepreneurship in the poultry sector.

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123 **THEORETICAL FOUNDATIONS**

Entrepreneurial development strategies refer to a set of planned actions and policies aimed at fostering an entrepreneurial culture, identifying and leveraging innovative opportunities, and building entrepreneurial capacities within organizations or industries. These strategies may include support for innovation, empowerment of human resources, encouragement of risktaking, and the establishment of supportive infrastructures, all contributing to economic growth and societal value creation. Such approaches are crafted at both macro and micro levels with

130 the goal of enhancing competitiveness and entrepreneurial capabilities (Morris et al., 2009). 131 In the field of entrepreneurial development strategies, various theories have been proposed, 132 each addressing specific aspects of entrepreneurship and offering insights for enhancing 133 organizational and industrial performance in this domain. Schumpeter's Theory of Creative 134 Destruction (1934) regards entrepreneurship as a force of creative destruction that drives 135 innovation and economic development (Croitoru, 2012). According to this theory, 136 entrepreneurs introduce new products, technologies, and processes, reshaping market structures 137 and creating new opportunities that contribute to economic growth. Kirzner (1973) emphasizes 138 in his Theory of Entrepreneurial Discovery the importance of identifying untapped market opportunities, proposing that entrepreneurs can enhance the economy by addressing and 139 leveraging market imbalances. The Resource-Based View (RBV) by Barney (1991) posits that 140 141 an organization's unique resources and capabilities can lead to sustainable competitive 142 advantage and entrepreneurial development. Additionally, Innovation Systems Theory Freeman (1987) highlights that innovation and entrepreneurship depend on supportive 143 environments, policies, institutions, and networks, suggesting that entrepreneurial development 144 requires appropriate infrastructure, governmental support, and policies to strengthen innovation 145 146 and industrial growth. The Cognitive Theory of Entrepreneurship Mitchell et al. (2002) focuses

147	on the cognitive and psychological processes of entrepreneurs, examining the mental and
148	psychological factors involved in identifying and acting upon opportunities. The Theory of
149	Planned Behavior Ajzen (1991) posits that individuals' intentions for entrepreneurial behavior
150	are influenced by three main factors: attitudes toward the behavior, subjective norms, and
151	perceived behavioral control, which help entrepreneurs better understand the determinants of
152	their decision-making processes. Finally, the Entrepreneurial Ecosystem Theory Isenberg,
153	explores the factors that shape the entrepreneurial environment and are essential for
154	entrepreneurial development, such as human capital, venture capital, infrastructure,
155	government policies, and an entrepreneurial culture (Aryal, 2021). Collectively, these theories
156	provide robust theoretical frameworks for fostering entrepreneurial development and assist
157	organizations and policymakers in identifying strengths and opportunities to create
158	environments conducive to entrepreneurial growth and innovation.
159	In this regard, entrepreneurial development strategies can be classified at three levels: macro
160	(industry), meso (sectoral), and micro (firm). At the macro level, these strategies focus on
161	establishing infrastructure, supportive policies, and an environment conducive to
162	entrepreneurial growth across the entire industry. Examples include creative destruction
163	strategies, based on Schumpeter's theory, which emphasize fostering innovation and new
164	technologies to reshape market structures and create new opportunities; opportunity discovery
165	strategies, grounded in Kirzner's theory, which focus on identifying and capitalizing on new
166	opportunities and addressing market imbalances at the industry level; entrepreneurial
167	ecosystem strategies, which aim to strengthen ecosystem factors like human capital, venture
168	capital, infrastructure, and government policies to support entrepreneurship; and innovation
169	enhancement strategies, derived from Innovation Systems Theory, which build a supportive
170	environment at the industry level through infrastructure, institutions, and policies that
171	encourage sustained innovation.
172	Meso-level entrepreneurial development strategies, acting as a bridge between macro
173	policies and micro-level actions, focus on strengthening key factors for fostering
174	entrepreneurship within a specific sector. These strategies include creating and enhancing value
175	networks and supply chains, supporting sector-specific innovation and technology, establishing
176	industry associations and cooperatives, and providing training and skill development at the
177	sectoral level. Drawing on the theories of Creative Destruction, Innovation Systems, and
178	Entrepreneurial Ecosystems, these initiatives provide the necessary infrastructure and
179	connections, enabling entrepreneurs to capitalize on new opportunities while enhancing

180	collaboration and human resources. Additionally, these strategies encourage risk-taking and
181	cultivate an entrepreneurial culture within the industry, creating a foundation for sustainable
182	innovation and growth.
183	Finally, at the micro level, entrepreneurial development strategies are directed toward
184	identifying, leveraging, and enhancing internal capacities within organizations to foster
185	sustainable innovation and competitiveness. These include resource and capability-based
186	strategies, based on the Resource-Based View (RBV), which strengthen unique organizational
187	resources and capabilities to achieve sustainable competitive advantage; cognitive
188	entrepreneurship strategies, grounded in Cognitive Theory, which develop entrepreneurs'
189	cognitive processes for identifying and utilizing internal opportunities; planned behavior-based
190	strategies, based on the Theory of Planned Behavior, which reinforce factors such as attitudes,
191	subjective norms, and perceived control that influence entrepreneurial intent within the
192	organization; and internal innovation enhancement strategies, which focus on supporting in-
193	house innovation and empowering human resources to develop new ideas and products.
194	Together, these strategies at macro, meso, and micro levels assist industries and organizations
195	in leveraging resources to create environments conducive to entrepreneurial growth and
196	innovation across the poultry industry.
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198	MATERIALS AND METHODS
199	Study Area
200	The county of Mashhad, located in the north-eastern region of Iran, was selected as the
201	study area due to its critical role in the agricultural and poultry industries of the country. The
202	county's agricultural potential and its significance in the poultry sector make it an ideal region
203	for investigating entrepreneurial opportunities in agriculture. Mashhad is situated in the north-
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205	eastern region of Iran and serves as the capital of Khorasan Razavi Province (Figure 1).
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206 207 208	eastern region of Iran and serves as the capital of Khorasan Razavi Province (Figure 1). Khorasan Razavi Province accounts for 3.9% of Iran's total livestock production, with an annual output of 1,575,727 tons. The province ranks second in egg production with a 13% share and is the third-largest producer of poultry meat in Iran, with an annual production of approximately 120,000 tons (Ministry of Agriculture-Jahad 2021). The share of Mashhad in the agricultural
206 207 208 209	eastern region of Iran and serves as the capital of Khorasan Razavi Province (Figure 1). Khorasan Razavi Province accounts for 3.9% of Iran's total livestock production, with an annual output of 1,575,727 tons. The province ranks second in egg production with a 13% share and is the third-largest producer of poultry meat in Iran, with an annual production of approximately 120,000 tons (Ministry of Agriculture-Jahad 2021). The share of Mashhad in the agricultural production of Khorasan Razavi province is 13%, holding the first rank among the counties in
206 207 208 209 210	eastern region of Iran and serves as the capital of Khorasan Razavi Province (Figure 1). Khorasan Razavi Province accounts for 3.9% of Iran's total livestock production, with an annual output of 1,575,727 tons. The province ranks second in egg production with a 13% share and is the third-largest producer of poultry meat in Iran, with an annual production of approximately 120,000 tons (Ministry of Agriculture-Jahad 2021). The share of Mashhad in the agricultural production of Khorasan Razavi province is 13%, holding the first rank among the counties in the province. In terms of the number of livestock units, it also ranks second in the province,
206 207 208 209 210 211	eastern region of Iran and serves as the capital of Khorasan Razavi Province (Figure 1). Khorasan Razavi Province accounts for 3.9% of Iran's total livestock production, with an annual output of 1,575,727 tons. The province ranks second in egg production with a 13% share and is the third-largest producer of poultry meat in Iran, with an annual production of approximately 120,000 tons (Ministry of Agriculture-Jahad 2021). The share of Mashhad in the agricultural production of Khorasan Razavi province is 13%, holding the first rank among the counties in the province. In terms of the number of livestock units, it also ranks second in the province, accounting for a 10% share (Ministry of agriculture-jihad 2021). In a way that currently, there

- of agriculture-jihad 2021). Therefore, the poultry industry in Mashhad is one of the most
 significant economic sectors, offering substantial potential for job creation and production
 growth. Therefore, considering the potential of the county of Mashhad in the production of
- 216 poultry-related products and the role of agricultural entrepreneurship in the economy, the
- 217 county of Mashhad was chosen as the study area to ultimately provide solutions for the
- 218 development of entrepreneurship in this region.



Figure 1. Geographical location of the study area in Khorasan Razavi Province, Iran (Bahraseman *et al.*, 2024).

219 Statistical Population

In this study, the sampling method used was "Sampling to Achieve Representativeness or 220 221 Comparability," a form of purposive sampling. Purposive sampling, also known as qualitative 222 sampling, involves intentionally selecting participants to gain specific insights or knowledge. 223 Unlike methods that aim to establish generalizable findings or fixed rules, purposive sampling focuses on deepening understanding within a specialized context. In this approach, researchers 224 225 determine sample size based on mental processes, seeking participants who will provide the 226 most comprehensive information about the phenomenon under investigation. Accordingly, 227 twenty interviews were conducted with stakeholder groups in September 2023 to examine the

228	challenges related to enhancing and developing entrepreneurship in small and medium-sized
229	enterprises within the poultry industry.
230	This study utilized field research, literature review, interviews, and surveys to identify
231	strategies for enhancing entrepreneurship in the poultry industry. Accordingly, twenty
232	interviews were conducted with stakeholder groups in September 2023 to examine the
233	challenges related to enhancing and developing entrepreneurship in small and medium-sized
234	enterprises within the poultry industry. Table 2 displays the frequency of individuals
235	participation in the interviews related to the research.
236	Table 2. The rate of engagement of stakeholders in interview sessions.
	Participants Number of participants
	Government organization managers 7
	Academic individuals 5
	Poultry farmers 8
	Total 20
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238	Methodology

This study adopts a pragmatic paradigm with a quantitative and exploratory approach to 239 identify and prioritize strategies for entrepreneurial development in the poultry industry. 240 Utilizing SWOT analysis integrated with the Ordinal Priority Approach (OPA), the research 241 employs a systematic and quantitative method for evaluating and ranking strategic factors. The 242 OPA model was applied using specialized web-based software for multi-criteria decision 243 analysis. Ataei et al. (2020) and Mahmoudi et al. (2023) were the developers of this software. 244 245 Figure 2, shows the incorporation of the SWOT-OPA methodology used in this study to 246 identify the factors influencing entrepreneurship development in the poultry industry. The 247 primary aim of this approach is to outline and prioritize alternative strategies for the progression of entrepreneurship within the poultry sector. The process of identifying factors influencing 248 249 entrepreneurship in the poultry industry included conducting a SWOT analysis. Following this, the OPA approach was implemented to assess the weight of each SWOT sub-factor, and the 250 251 OPA method was employed to prioritize alternative strategies. The subsequent section presents 252 a brief overview of the methodologies applied in this study.



Figure 2. The framework of SWOT-OPA in the study.

253 **SWOT**

254 The SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis is a strategic 255 planning tool used to evaluate internal and external factors that affect an organization's success 256 (Taherdoost and Madanchian, 2021). Strengths and weaknesses are internal factors, while opportunities and threats are external. Strategies derived from SWOT analysis include (see 257 258 Figure 3): aggressive strategies (SO), leveraging strengths to capitalize on opportunities; 259 conservative strategies (WO), mitigating weaknesses by exploiting opportunities; competitive 260 strategies (ST), utilizing strengths to mitigate the impact of threats; and defensive strategies 261 (WT), employed when external threats align with internal weaknesses. In this scenario, the 262 defensive strategy aims to prevent negative internal weaknesses from being highly vulnerable 263 to external threats (Raddad, 2022). This analysis is widely applied in business, marketing, and 264 decision-making to formulate strategies based on a thorough understanding of influencing factors (Stefan et al., 2021). This study employs SWOT analysis to propose strategies for 265 enhancing entrepreneurship in Mashhad's poultry industry. 266

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270	Figure 3. The configuration of the SWOT matrix.				
	Internal External	Strengths	Weaknesses		
	Opportunities	SO strategy (offensive)	WO strategy (conservative)		
	Threats	ST strategy (competitive)	WT strategy (defensive)		

271 Ordinal Priority Approach (OPA)

272 The OPA (Ordinal Priority Approach) is a significant advancement within the field of 273 Multiple Criteria Decision Making (MCDM) theory through a linear mathematical model. This approach was suggested by (Ataei et al., 2020). The OPA method supports both individual and 274 275 group decision-making by simultaneously considering experts, criteria, and alternatives. It 276 excels in calculating rankings, expert weights, and criteria weights without the need for 277 conventional normalization, and can handle incomplete data. This means that when experts lack 278 sufficient knowledge or relevant experience in the judgment process, they can skip certain 279 options related to a specific criterion, thereby enhancing decision-making accuracy and 280 efficiency (Sadeghi et al., 2022).

OPA, unlike similar decision-making techniques, calculates alternatives rankings, expert weights, and criteria weights simultaneously. OPA does not require aggregation methods for gathering expert judgments in group decision-making. Furthermore, OPA does not utilize pairwise comparison matrices for alternatives and criteria (Mahmoudi *et al.*, 2021). Instead, it requires ordinal data for criteria and alternatives. In order to explain the steps of OPA, it is essential to have a clear understanding of the variables, indexes, and sets as outlined in Table 3.

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Table 3. Sets, indexes, and variables used in the OPA.

Sets	
Ι	Set of experts $\forall i \in I$
J	Set of criteria $\forall j \in J$
Κ	Set of alternatives $\forall k \in \mathbf{K}$
Indexes	
i	Index of the experts $(1,, p)$
j	Index of preference of the criteria $(1,, n)$
k	Index of the alternatives $(1,, m)$
Variables	3
Ζ	The objective function
Wijk ^r	Weight (importance) of k^{th} alternative based on j^{th} criterion by i^{th} expert at r^{th} rank
Paramete	rs
i	The rank of expert <i>i</i>
j	The rank of criterion <i>j</i>
r	The rank of alternative k

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290 The computational process of OPA encompasses the following stages:

- 291 Step 1 involves the process of identifying the criteria and sub-criteria for alternatives selection.
- 292 Step 2 entails determining the ordinal preferences for criteria and sub-criteria.
- 293 Step 3 involves constructing the linear model (Equation 1) using the information collected from
- steps 1 and 2. Subsequently, can be using appropriate software such as LINGO, MATLAB,
- 295 Python, or similar tools to solve the model.

Max Z

s.t.

 $Z \leq i (j (r (W_{ijk}r - W_{ijk}r^{+1}))) \quad \forall i, j, k \text{ and } r$ $Z \leq ijmWijk^{m} \quad \forall i, j \text{ and } k$ $p \quad n \quad m \qquad (1)$ $\sum \sum \sum W_{ijk} = 1$ $i=1 \quad j=1 \quad k=1$ $W_{ijk} \geq 0 \qquad \forall i, j \text{ and } k \qquad \text{where } Z: \text{ Unrestricted in } sign$

After successfully solving the model, Eq. (2) is employed to determine the alternatives weights.

$$p \qquad n$$

$$W_k = \sum \sum W_{ijk} \quad \forall k \qquad (2)$$

$$i=1 \ j=1$$

297 In order to determine the criteria weights, Equation (3) is applied.

$$p \quad m$$

$$Wj = \sum \sum Wijk \quad \forall j$$

$$i=1 \ k=1$$
(3)

298 For the computation of expert weights, Equation (4) is utilized.

$$n \quad m$$

$$W_i = \sum \sum W_{ijk} \quad \forall i$$

$$j=1 \ k=1$$
(4)

Subsequently, these weights can be utilized for decision-making and the ranking of criteria,experts, and alternatives.

301302 RESULT AND DISCUSSION

303 Effective factors influencing entrepreneurship development in the poultry subsector in

304 Mashhad have been identified based on library research, expert interviews, field studies, and

relevant literature (Column 3 in Table 4). The results of the evaluation matrix of internal and external factors for entrepreneurial development in the poultry subsector, using the OPA approach, are reported in Table 4. Among the four strengths ranked by the expert community, Factor S4, which is the presence of poultry farmers' unions and associations, secured the highest ranking with a score of 0.0922.

Experts in this research find that poultry farmers' unions and associations in Mashhad are crucial for poultry entrepreneurship due to their role in information exchange, resource procurement, and understanding market challenges. These organizations help reduce production costs, improve access to quality resources, and foster an entrepreneurial culture. This supports findings by Karami and Agahi (2018), who noted that cooperatives and supplier associations positively impact the capabilities and motivation of poultry business owners.

316 Among the identified six weaknesses, the low capacity of input production and the shortage of 317 poultry inputs in the country (W6) has been assigned the highest ranking with a score of 318 0.09813. Experts identify the scarcity of poultry inputs and reliance on imports as a major 319 weakness, leading to higher production costs and reduced competitiveness. This shortage 320 hampers export performance, limits new business development, and poses challenges for entrepreneurs in the poultry industry. It may even lead entrepreneurs to fear a lack of input, 321 322 discouraging them from initiating new businesses. In this regard, reference can be made to (Zaghari, 2018), which identifies poultry nutrition and the shortage of production inputs as one 323 324 of the main challenges in poultry farming in Iran.

SWOT factors		SWOT sub-factors	Weight	Rank ²	Overall Rank
	S 1	High market share	0.9027	2	12
Strengths (S)	S2	Presence of significant technical knowledge and specialized human resources in the poultry sub-sector	0.7750	4	14
	S 3	The conditions and capacities of the province in the field of poultry-related productions	0.8431	3	13
	S4	Existence of poultry farmers' unions and associations	0.9222	1	9

Table 4. Matrix of internal and external factors evaluation for entrepreneurial development in the poultry subsector.

² The "Rank" in the fifth column represents the ranking of each strength, weakness, opportunity, and threat individually, indicating, for example, which strength ranks highest among the four listed strengths. In contrast, the "Rank" in the last column provides an overall ranking across all strengths, weaknesses, opportunities, and threats, showing which factor holds the highest rank among them collectively.

		Insurance coverage shortages and			
	W1	weaknesses in support programs during crisis conditions	0.9789	2	3
		Lack or insufficiency of poultry			
Washnass (W)	W2	product processing and storage industries	0.9552	4	6
weakness (w)	W3	Low diversity of processed products	0.9444	5	7
	W4	Low competitiveness	0.9279	6	8
	W5	Lack of attention to branding	0.9554	3	5
		Low capacity for the production			
	W6	of inputs in the country and a shortage of poultry inputs	0.9813	1	2
	01	Proximity to the border for exports	0.9662	1	4
Opportunities (O)	O2	Market growth and increased demand for poultry products	0.9131	2	11
	O3	Existence of private sector capital	0.1751	4	18
	O4	One of the priority sub-sectors in agriculture for the government	0.2045	3	16
	T1	Sanctions on the country and difficulties in obtaining equipment such as drugs, vaccines and technology transfer	0.6808	3	15
Threats (W)	T2	Fluctuations in raw material prices	0.9853	1	1
	Т3	inefficiency of supportive policies for production	0.9196	2	10
	T4	Existence of contagious avian diseases	0.1863	4	17

325 Source: research findings.

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327 According to the results of the OPA approach for evaluating the matrix of external factors, it is evident that, as per the experts' opinions, the highest priority among the four identified 328 329 opportunities for entrepreneurial development in the poultry subsector is attributed to the proximity to borders for exports (O1). This criterion has been assigned the highest ranking with 330 331 a score of 0.9662. Proximity to borders creates new export opportunities and encourages producers to optimize production by adhering to international standards, which enhances 332 333 product quality and competitiveness. Additionally, export activities driven by production 334 growth provide a platform for entrepreneurial development and increased employment. In 335 support of this conclusion, reference can be made to the study conducted by Doan (2022), which has found that changes in international trade market dynamics in Vietnam and access to export 336 337 markets significantly impact the activities of entrepreneurial enterprises. Furthermore, Khanal 338 (2018) considers access to distant Western markets as a motivator for entrepreneurial farmers 339 in Nepal.

340 The a

The analysis of identified threats has shown that changes in raw material prices (T2) have

341 obtained the highest score of 0.9853. Fluctuations in raw material prices increase production 342 costs, reducing profitability and raising final product prices, which negatively impacts marketability and competitiveness. This is particularly challenging for new entrepreneurs and 343 344 small businesses in the poultry industry. As a result, these price changes can dampen investment decisions, entrepreneurial enthusiasm, and business development strategies. In this regard, the 345 findings of the study by Shoofiyani et al. (2022) also demonstrated that price fluctuations in 346 347 commodities (such as chicken feed or vaccines/boosters) have resulted in increased costs and 348 impact the activities of the supply chain.





As illustrated in Figure 4, a comprehensive comparison was conducted for all sub-factors of the SWOT analysis pertaining to entrepreneurship in the poultry industry The foremost factors, in descending order of significance, include fluctuations in raw material prices (T2) with a weight of 0.9853, low capacity for the production of inputs in the country and a shortage of poultry inputs (W6) with a weight of 0.9813, and Insurance coverage shortages and weaknesses in support programs during crisis conditions (W1) with a weight of 0.9789.

After identifying the internal and external factors related to entrepreneurial development in the poultry subsector and scoring them using the OPA method, practical strategies for entrepreneurship development in this area were extracted (Table 5). Subsequently, the prioritization of these strategies was performed using the OPA technique. Columns three and four of Table 5, respectively, indicate the final weights and rankings of the strategies.

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Table 5. Entrepreneurship development strategies ranking in the poultry subsector using the OPA technique.				
	Strategies	Weight	Rank	
ST1	Establishing a strong network (strengthening collaboration)	0.0722	8	
WO1	Investing in Infrastructure	0.0833	6	
WO2	Transferring responsibilities related to the poultry industry from the	0.1119	1	
	government to the private sector			
SO1	Improving Animal Welfare	0.0260	14	
WT1	Utilizing the capacities of knowledge-based companies for the	0.0968	2	
	provision of new inputs			
WT2	Branding and marketing	0.0931	3	
WO3	Diversifying income streams	0.0728	7	
ST2	Implementing biosecurity measures	0.0463	12	
WT3	Expanding insurance coverage	0.0921	4	
ST3	Market Research	0.0615	10	
WO4	Utilizing Innovative Technologies in Production Units	0.0666	9	
SO2	Conducting workshops and training courses for entrepreneurs in this	0.0359	13	
	field			
SO3	Developing an entrepreneurial culture in the poultry industry (to	0.0507	11	
	enhance risk-taking)			
WT4	Financial provision	0.0907	5	

364 Source: research findings.





366 three competitive strategies, and four conservative strategies.

Figure 5. Overall ranking of strategies.

As shown in Figure 5, all strategies related to entrepreneurship development in the poultry industry were compared. Transferring responsibilities related to the poultry industry from the government to the private sector (WO2), utilizing the capacities of knowledge-based companies for the provision of new inputs (WT1), and Branding and marketing (WT2) have been recognized as the important strategies, each assigned weights of 0.1119, 0.0968, and 0.0931, correspondingly. According to the results of Table 5 and figure 5, the most important

- 373 entrepreneurship development strategies in the poultry subsector include:
- **Rank 1: Transferring responsibilities related to the poultry industry from the government**
- 375 to the private sector (WO2)
- 376 The institutional structure of Iran's poultry industry is characterized by a significant level 377 of government intervention, which, while aimed at stabilizing prices and ensuring food security, 378 often leads to inefficiencies. Government-supervised privatization, as a context-specific 379 strategy, seeks to leverage the capabilities of the private sector to mitigate bureaucratic delays 380 and foster innovation. This approach aligns with the successful implementation of similar strategies in other sectors, where gradual privatization under regulatory oversight has improved 381 382 operational flexibility and market responsiveness (Barcho, 2019). In the context of Iran, the 383 role of cohesive cooperatives and associations within the poultry sector can be expanded to take 384 on responsibilities traditionally held by the government, such as input procurement and market 385 coordination. This shift reduces bureaucratic barriers, enhances entrepreneurs' autonomy, and 386 creates a competitive environment conducive to new business ventures. Additionally, the 387 transfer of tasks must be complemented by robust institutional support, including clear 388 regulatory frameworks and incentives, to ensure a smooth transition and sustained growth in 389 entrepreneurial activities. This finding is consistent with the research by Ilham (2015), which 390 highlights that privatization, combined with government oversight, can enhance the 391 performance of poultry industry businesses. This approach strengthens production structures, 392 reduces economic vulnerabilities, and improves efficiency.
- 393

Rank 2: Utilizing the capacities of knowledge-based companies for the provision of new inputs (WT1)

Knowledge-based companies lead innovation in nutrition, health, and technology within the poultry industry, creating new opportunities for entrepreneurs in breeding and processing. Their close connections with the market help entrepreneurs effectively understand and respond to market needs (Bayo and Emmanuel, 2020). By offering solutions to optimize input production and supply high-quality inputs, these companies reduce risks and enhance production management. Leveraging their expertise is crucial for improving processes and fostering entrepreneurial growth in the poultry sector.

404 **Rank 3: Branding and marketing (WT2)**

Branding creates a unique business identity and, when paired with effective marketing,

403

406 protects against market fluctuations, ensuring stability. In the poultry industry, where price 407 volatility is frequent, developing and reinforcing product brands is crucial for long-term success (Doan, 2022). In this regard, Shoofiyani et al. (2022) also emphasized that new entrants in the 408 409 poultry industry, particularly entrepreneurs, must enhance consumer awareness of their brand. 410 One effective approach to enhance product awareness is the implementation of a 411 comprehensive marketing strategy. Additionally, Subagia et al. (2022) consider continuous 412 improvement in the quality of poultry slaughterhouse products and a strong brand as essential 413 elements for competing with similar businesses.

414

415 Rank 4: Expanding insurance coverage (WT3)

Insurance coverage can support producers against economic losses resulting from various factors such as natural disasters, diseases, or market fluctuations (Alam *et al.*, 2020). Insurance provides compensation to poultry farmers in Iran if the entire farm stock (flock) is lost, which can diminish the motivation of entrepreneurs in the poultry sub-sector. In general, increasing insurance coverage in the poultry industry (Payment of indemnity in case of losses and damage to a percentage of the flock) can create a more secure environment for entrepreneurs, encouraging them to take risks and expand their businesses.

423 424

Rank 5: Financial provision (WT4)

425 Access to financial resources is crucial for establishing, expanding, and managing poultry 426 businesses, as it allows for easier procurement of production inputs and mitigates risks from 427 price fluctuations (Daemane and Muroyiwa, 2022). Favorable financial conditions also 428 encourage innovation in production, marketing, and management, improving efficiency and 429 fostering entrepreneurial growth in the poultry industry. In this regard, Aqajani et al. (2008) 430 have identified financial provision through low-interest loans as a primary need for 431 entrepreneurs, which is considered one of the main responsibilities of the government. 432 Additionally, De Clercq et al. (2009) identified a lack of capital and financial resources as 433 obstacles to entrepreneurship.

435 **Rank 6: Investing in Infrastructure (WO1)**

Investment in infrastructure, including poultry farms, transportation, and processing facilities, enhances efficiency and stimulates local economies, contributing to business competitiveness (Subagja *et al.*, 2022). Such investments create a favorable environment for entrepreneurship in the poultry industry. Regmi and Naharki (2020), emphasize that supporting

- agriculture entrepreneurship requires investment in essential infrastructures like R&D systems,
 transportation, marketing, and storage facilities. These investments are crucial for promoting
 and sustaining entrepreneurship in the sector.
- 443

444 Rank 7: Diversifying income streams (WO3)

Diversifying income streams in the poultry industry through multiple sources, like meat and egg sales or innovative technologies, reduces risks and increases business resilience. This strategy enhances competitiveness, attracts new customers, and strengthens market position, enabling entrepreneurs to capitalize on various opportunities while minimizing risks.

449

450 Rank 8: Establishing a strong network (strengthening collaboration) (ST1)

451 Being part of a network allows entrepreneurs to stay informed about market trends, 452 consumer preferences, and industry innovations. Networking and access to exhibitions and 453 conferences can strengthen the entrepreneurial culture and relationships among entrepreneurs, 454 while also helping them better manage challenges and risks. (Ribeiro et al., 2021). Networking 455 can reduce the lack of entrepreneurial culture, leading to the identification and creation of 456 diverse job opportunities (Regmi and Naharki, 2020). Agajani et al. (2008) emphasized in their study that implementing entrepreneurial ideas requires an understanding of prerequisites, which 457 458 can be achieved through organizing exhibitions and conferences.

459

467

460 Rank 9: Utilizing Innovative Technologies in Production Units (WO4)

The adoption of innovative technologies, such as the Internet of Things (IoT), in poultry production enhances safety, product quality, and access to international markets, leading to increased productivity and profitability (Kraus *et al.*, 2021). These efficiency gains motivate entrepreneurs in the poultry sector. Developing organizational data strategies and attracting specialized IoT talent are crucial for leveraging these technologies to boost revenue and drive entrepreneurial motivation (Shoofiyani *et al.*, 2022).

468 Rank 10: Market Research (ST3)

When entrepreneurs have a clear understanding of market needs and opportunities through market research, they can tailor their poultry-related ventures to meet those demands more effectively, enhancing the entrepreneurship landscape in the sector. Identifying innovative opportunities and assessing market demand ensures successful product supply, supporting the growth and sustainability of poultry businesses (Khoshmaram *et al.*, 2019). ()() 2024), proposed

474 that increasing consumer awareness of the benefits of export products could lead to higher 475 demand and strengthen exports to target markets. Additionally, Hosseinzadeh *et al.* (2022), 476 emphasized that focusing on the development of new products, understanding global markets, 477 and engaging with the broader community leads to growth and improvement in agricultural 478 entrepreneurship activities. Moreover, Regmi and Naharki (2020) concluded that the lack of 479 agricultural research is a significant barrier to the overall development of the agricultural sector 480 in Nepal.

481

482 Rank 11: Developing an entrepreneurial culture in the poultry industry (to enhance risk483 taking) (SO3)

484 Developing an entrepreneurial culture fosters innovation and encourages individuals to 485 embrace new ideas, increasing their willingness to take risks. This, in turn, supports 486 entrepreneurial development and the establishment of innovative businesses in the poultry 487 industry. In this context, can refer to the findings of the study by Fritsch and Wyrwich (2018), 488 who stated that the prevalence of entrepreneurial culture has had a significant impact on the 489 emergence of new businesses in Germany.

490

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491 Rank 12: Implementing biosecurity measures (ST2)

Poultry production generates by-products such as waste from droppings, hatcheries, and feed, raising environmental and health concerns (KA & Benson, 2014). Environmental pollution, widespread diseases, etc., impact entrepreneurship development and societal progress (Doan, 2022). Biosecurity measures in the poultry industry reduce the risk of disease transmission and potential economic losses and mortality. These measures also help meet regulatory standards and consumer expectations, ensuring the quality and safety of poultry products.

500 Rank 13: Conducting workshops and training courses for entrepreneurs in this field501 (SO2)

Workshops provide entrepreneurs with market insights and specialized knowledge, enhance their confidence and decision-making abilities, and offer motivation for successful business investments (Galvão *et al.*, 2020). So, empowering individuals through enhancing their knowledge and skills levels in performing activities leads to development (Abdollahi Kalourazi *et al.*, 2020). Furthermore, Karami and Agahi (2018) stated that if creativity and innovation in agriculture are combined with individuals' skills and managerial capabilities, agricultural

508 entrepreneurship will experience significant growth.

509

510 Rank 14: Improving Animal Welfare (SO1)

511 Improving animal welfare by providing proper spaces, nutrition, and natural conditions 512 reduces stress and disease, enhances product quality (Buller et al., 2020). High-quality products 513 are more readily accepted in the market and can command better prices. Additionally, 514 improving animal welfare can align businesses with local and international regulations and 515 standards, aiding in the recognition and validation of businesses while promoting ethical and 516 social standards associated with animal husbandry (FAO 2023). Enhancing animal welfare in 517 the poultry industry fosters entrepreneurial opportunities in equipment production, welfare-518 focused management, and consulting services. This not only creates new business prospects but 519 also supports the long-term sustainability of poultry farming.

By amalgamating these approaches, one can improve the advancement of entrepreneurship in
the poultry sector, consequently fostering the generation of economic prospects and augmenting
the sustainability and adaptability of the food system.

523

524 CONCLUSION

525 This research has been conducted with an approach based on entrepreneurship 526 reinforcement in the poultry sub-sector in Mashhad. The strategies proposed in this study 527 specifically advocate the importance of actions such as market research and branding, utilization of innovative technologies, improvement of animal welfare, investment in 528 529 infrastructure, implementation of environmental health measures, financial provision, 530 expansion of insurance services, delegation of responsibilities to the private sector, and 531 leveraging the capabilities of knowledge-based companies. These actions, in conjunction with 532 each other, lead to entrepreneurship enhancement and sustainable development of the poultry 533 industry through market improvement, increased productivity, risk reduction, and 534 entrepreneurial culture development. Also, these measures empower entrepreneurs in the 535 poultry industry to manage various challenges and opportunities effectively.

536

1. Transfer of Responsibilities to the Private Sector

537 The study results indicate that the primary strategy for fostering entrepreneurship in the 538 poultry industry is the transfer of responsibilities related to the poultry industry from the 539 government to the private sector and associations. Delegating responsibilities to the private 540 sector can enhance flexibility, competition, and private investment, as the private sector can

541 more swiftly address market needs without bureaucratic delays. Therefore, it is recommended,

542 given the existence of cohesive cooperatives and associations, that tasks related to the poultry

543 industry be transferred from the government to the private sector, with the government

- 544 overseeing the execution of these responsibilities.
- 545 2. Utilization of Knowledge-Based Companies for Innovation

546 The second priority is to leverage the capabilities of knowledge-based companies to drive 547 innovation in poultry input production. Given the constraints on input production in Iran and the challenges faced by poultry producers, utilizing these companies for developing new inputs 548 549 is crucial. Therefore, it is recommended to create platforms for communication between knowledge-based companies and poultry producers to facilitate technology transfer. 550 551 Additionally, monitoring and evaluating the impact of these innovations is essential. In this 552 regard, allocating experimental farms for this purpose can ensure the enhancement of 553 production processes through the capabilities of knowledge-based companies.

554 3. Establishment of International Animal Health Standards and Financial Incentives for 555 Export

At the international level, it is recommended that governments establish and advance international animal health standards and provide financial incentives to entrepreneurs for entering global markets and boosting exports, thereby increasing competition in the poultry industry. Additionally, governments should leverage successful practices from leading countries to enhance this sector's contribution to global food security.

4. Organizing Workshops and Training Courses for Entrepreneurs The findings of this
 study can have practical implications for producers in the poultry sub-sector, such as organizing
 workshops and training courses. These initiatives can boost the confidence and motivation of
 entrepreneurs, encouraging them to initiate and succeed in business ventures.

565 **5. Improving Access to Financial Resources and Expanding Insurance Coverage** Other 566 implications include improving government support programs to facilitate access to financial 567 resources for entrepreneurs. Additionally, creating employment policies in the poultry industry 568 and expanding insurance coverage to support producers in managing production risks are 569 highlighted as potential outcomes of these results.

570 Study Limitations and Recommendations for Future Research

571 This study, while comprehensive, has certain limitations that should be acknowledged. 572 Addressing these limitations in future research could enhance the reliability and applicability 573 of findings related to entrepreneurial development in the poultry industry.

574	1. Regional Limitation: This research is focused specifically on Mashhad, which may
575	limit the generalizability of its findings to other regions. To address this, future research
576	should replicate similar studies across different regions with distinct cultural, economic,
577	and regulatory conditions. This comparative approach would allow for region-specific
578	strategies that better suit local needs.
579	2. Timeframe Constraints: The data collection was conducted over a limited period,
580	capturing a snapshot of the industry at a particular time. Given the dynamic nature of
581	markets, technologies, and government policies, future studies should consider a
582	longitudinal design. This would provide a more comprehensive view of how changes
583	over time affect the entrepreneurship landscape, allowing for adaptive strategies that
584	remain relevant as conditions evolve.
585	3. Sector-Specific Scope: This research is confined to the poultry industry, potentially
586	limiting its applicability to other agricultural sub-sectors. Future studies could expand
587	the scope to include similar agribusiness sectors, such as livestock or aquaculture. This
588	broader approach would yield comparative insights, highlighting unique challenges and
589	opportunities across agricultural industries.
590	Addressing these limitations can guide future research toward more robust, versatile, and
591	contextually relevant findings that better inform strategies for fostering entrepreneurship in
592	agriculture.
593	
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