

1 **Identifying Priority Strategies for Entrepreneurial Development in the**
2 **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
15 industry from the government to the private sector (SO) and using the capacities of knowledge-
16 based companies for innovation in the supply of poultry input (WT) have the highest scores. In
17 contrast, strategies such as organizing workshops and training courses (WO) and hiring skilled
18 labore (ST) have lower scores. The findings suggest practical concepts for poultry
19 entrepreneurs, including branding, technology adoption, establishing international animal
20 welfare standards, collaborating with knowledge-based companies, and privatization under
21 government supervision. These strategies can foster regional development by promoting
22 entrepreneurship, which in turn can increase employment, economic growth, and productivity,
23 ensuring a balanced distribution of opportunities and resources.

24 **Keywords:** Ordinal Priority Approach, Regional Development, Strategic Analysis, SWOT,
25 Entrepreneurship.

26
27 **INTRODUCTION**

28 The dynamic prospects of economic development, increasing population growth, global
29 food demand, and rising income levels have intensified the need for sustainable solutions in the
30 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).
34 As the agricultural sector serves as the cornerstone of any nation's economy (World Bank,
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
54 the profitability and incentives for poultry producers, ultimately impacting production levels
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).
58 Addressing this gap requires strategic interventions that enhance producer incentives and foster
59 an environment conducive to entrepreneurial activities (Simonov and Girfanova, 2023).
60 Entrepreneurship is crucial in overcoming these challenges and exploiting potential
61 opportunities within the poultry industry (Lin *et al.*, 2021). Agricultural entrepreneurship,
62 defined as the strategic pursuit of market opportunities to initiate and expand business activities
63 (Jafari-Sadeghi *et al.*, 2021), is particularly important in modernizing the poultry sector.

64 One of the most important goals of entrepreneurship development in agriculture is to
 65 modernize agricultural structures and create of a new agricultural environment for job creation
 66 (Gholamrezai *et al.*, 2021). In general, Agricultural entrepreneurship, accompanied by the risks
 67 of the agricultural sector, creates avenues for employment, increased income, enhanced quality
 68 of life, and greater individual participation in the economy. (Mohammadi *et al.*, 2017). An
 69 entrepreneurial farmer interprets challenges and environmental changes as opportunities and
 70 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
 75 entrepreneurship. In this context, the present study explores the landscape of entrepreneurship
 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 Sánchez (2017)	Europe	Analysing Entrepreneurial Behaviour in New and Existing Investments in European Agriculture.	random effects logit models	Newcomers in agriculture tend to lean more towards entrepreneurship compared to individuals with more prior agricultural experience.
Choudhury and Easwaran (2019)	Brahmaputra Valley, Assam (India)	Examining the Factors Influencing Agricultural Entrepreneurship in the Brahmaputra Valley, Assam.	Qualitative Analysis and Mean Decomposition Analysis	Human resources with limited knowledge and awareness, market facilities, and most importantly, supply and demand, serve as constraints in agricultural entrepreneurship development.
Martinho (2020)	European Union	Exploring Entrepreneurship Dimensions in European Union Agriculture Towards a More Sustainable Sector.	Descriptive Data Analysis and Cobb-Douglas Model-Based Regressions.	Policy tools play a significant role in entrepreneurship, so it is essential to enhance the mutual relationship between agricultural policies and entrepreneurship. Moreover, in agricultural entrepreneurship, economic aspects are pivotal.
Regmi and Naharki (2020)	Nepal	Evaluating the Factors Influencing Agricultural Trade Entrepreneurship.	SWOT	Increasing awareness about agricultural entrepreneurship, human resource development, infrastructure, government support, and establishing special export zones can contribute to harnessing the potential of agricultural trade entrepreneurship in Nepal.
Gholamrezai <i>et al.</i> (2021)	Iran	Designing a model for sustainable entrepreneurship among domestic producers of agricultural inputs	Structural Equation Model	Sustainable entrepreneurship is influenced by external factors such as mindset, contextual conditions like education and community understanding, and intervention factors such as government support and the development of technical infrastructure

81
82 Existing research (Table 1) has examined the general factors influencing agriculture
83 entrepreneurship, exploring its dimensions and obstacles through various quantitative and
84 qualitative methods, including decision-making approaches (Regmi and Naharki, 2020),
85 economic analysis (Khoshmaram *et al.*, 2019), qualitative analysis (Choudhury and Easwaran,
86 2019; Khosravipour and Shoeibi, 2022), correlation analysis, and structural equation modelling
87 (Gholamrezai *et al.*, 2021). However, there is a gap in studies where previous research does not
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
93 considers the macro (industry), meso (sectoral), and micro (firm) levels, as the optimal
94 implementation of many macro-level strategies necessitates their execution at both the meso
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).

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

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

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

122 THEORETICAL FOUNDATIONS

124 Entrepreneurial development strategies refer to a set of planned actions and policies aimed
125 at fostering an entrepreneurial culture, identifying and leveraging innovative opportunities, and
126 building entrepreneurial capacities within organizations or industries. These strategies may
127 include support for innovation, empowerment of human resources, encouragement of risk-
128 taking, and the establishment of supportive infrastructures, all contributing to economic growth
129 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
139 opportunities, proposing that entrepreneurs can enhance the economy by addressing and
140 leveraging market imbalances. The Resource-Based View (RBV) by Barney (1991) posits that
141 an organization's unique resources and capabilities can lead to sustainable competitive
142 advantage and entrepreneurial development. Additionally, Innovation Systems Theory
143 Freeman (1987) highlights that innovation and entrepreneurship depend on supportive
144 environments, policies, institutions, and networks, suggesting that entrepreneurial development
145 requires appropriate infrastructure, governmental support, and policies to strengthen innovation
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.

197 MATERIALS AND METHODS

198 Study Area

199 The county of Mashhad, located in the north-eastern region of Iran, was selected as the
200 study area due to its critical role in the agricultural and poultry industries of the country. The
201 county's agricultural potential and its significance in the poultry sector make it an ideal region
202 for investigating entrepreneurial opportunities in agriculture. Mashhad is situated in the north-
203 eastern region of Iran and serves as the capital of Khorasan Razavi Province (Figure 1).
204 Khorasan Razavi Province accounts for 3.9% of Iran's total livestock production, with an annual
205 output of 1,575,727 tons. The province ranks second in egg production with a 13% share and
206 is the third-largest producer of poultry meat in Iran, with an annual production of approximately
207 120,000 tons (Ministry of Agriculture-Jahad 2021). The share of Mashhad in the agricultural
208 production of Khorasan Razavi province is 13%, holding the first rank among the counties in
209 the province. In terms of the number of livestock units, it also ranks second in the province,
210 accounting for a 10% share (Ministry of agriculture-jihad 2021). In a way that currently, there
211 are 210 poultry farming units in the county of Mashhad, employing 20,414 workers (Ministry

213 of agriculture-jihad 2021). Therefore, the poultry industry in Mashhad is one of the most
 214 significant economic sectors, offering substantial potential for job creation and production
 215 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.

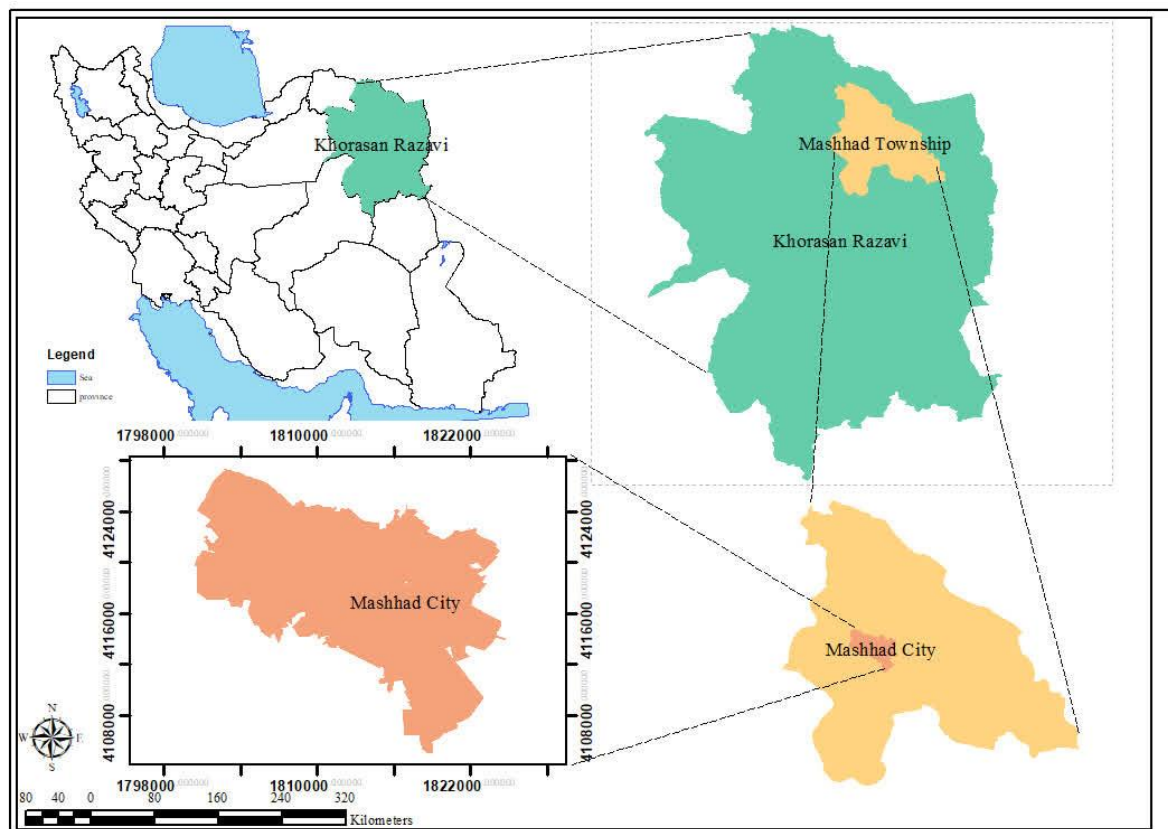


Figure 1. Geographical location of the study area in Khorasan Razavi Province, Iran (Bahraseman *et al.*, 2024).

219 Statistical Population

220 In this study, the sampling method used was “Sampling to Achieve Representativeness or
 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
 224 focuses on deepening understanding within a specialized context. In this approach, researchers
 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

237

238 Methodology

239 This study adopts a pragmatic paradigm with a quantitative and exploratory approach to
240 identify and prioritize strategies for entrepreneurial development in the poultry industry.
241 Utilizing SWOT analysis integrated with the Ordinal Priority Approach (OPA), the research
242 employs a systematic and quantitative method for evaluating and ranking strategic factors. The
243 OPA model was applied using specialized web-based software for multi-criteria decision
244 analysis. Ataei et al. (2020) and Mahmoudi et al. (2023) were the developers of this software.

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
248 of entrepreneurship within the poultry sector. The process of identifying factors influencing
249 entrepreneurship in the poultry industry included conducting a SWOT analysis. Following this,
250 the OPA approach was implemented to assess the weight of each SWOT sub-factor, and the
251 OPA method was employed to prioritize alternative strategies. The subsequent section presents
252 a brief overview of the methodologies applied in this study.

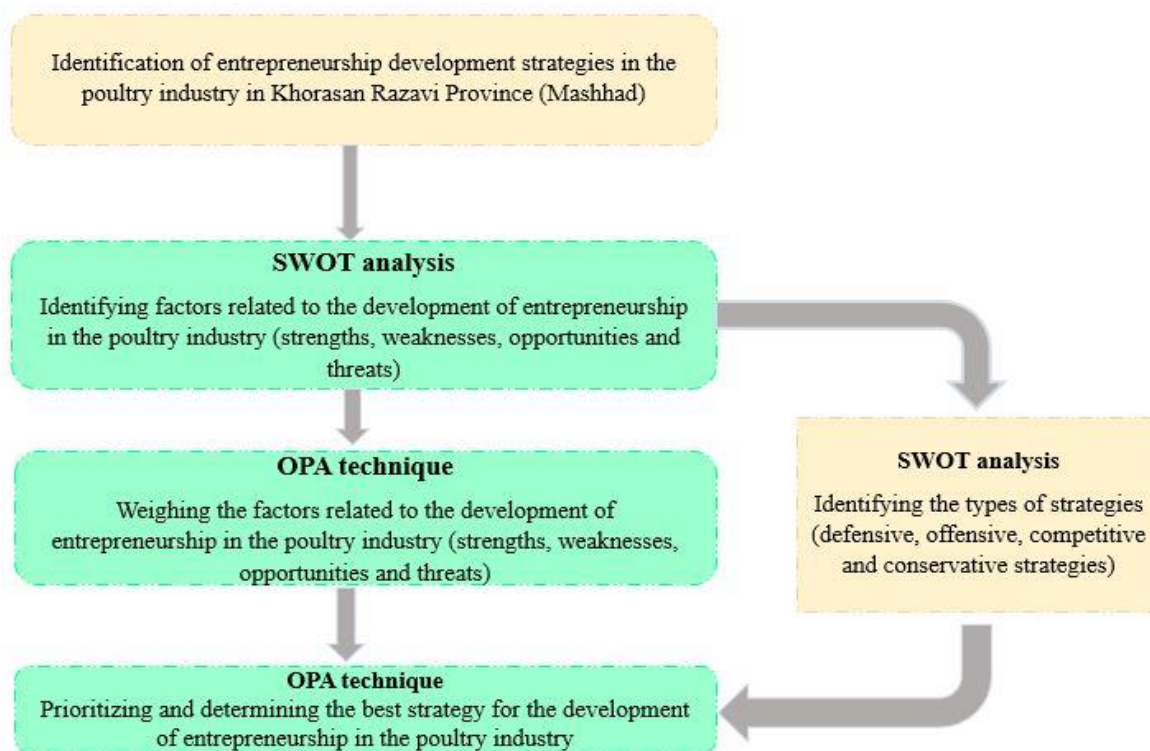


Figure 2. The framework of SWOT-OPA in the study.

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
 257 opportunities and threats are external. Strategies derived from SWOT analysis include (see
 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
 265 factors (Stefan *et al.*, 2021). This study employs SWOT analysis to propose strategies for
 266 enhancing entrepreneurship in Mashhad's poultry industry.

267

268

269

270

Figure 3. The configuration of the SWOT matrix.

	Internal	Strengths	Weaknesses
External			
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
 274 approach was suggested by (Ataei *et al.*, 2020). The OPA method supports both individual and
 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).

281 OPA, unlike similar decision-making techniques, calculates alternatives rankings, expert
 282 weights, and criteria weights simultaneously. OPA does not require aggregation methods for
 283 gathering expert judgments in group decision-making. Furthermore, OPA does not utilize
 284 pairwise comparison matrices for alternatives and criteria (Mahmoudi *et al.*, 2021). Instead, it
 285 requires ordinal data for criteria and alternatives. In order to explain the steps of OPA, it is
 286 essential to have a clear understanding of the variables, indexes, and sets as outlined in Table
 287 3.

288

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

Sets	
I	Set of experts $\forall i \in I$
J	Set of criteria $\forall j \in J$
K	Set of alternatives $\forall k \in K$
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	
Z	The objective function
W_{ijk}^r	Weight (importance) of k^{th} alternative based on j^{th} criterion by i^{th} expert at r^{th} rank
Parameters	
i	The rank of expert i
j	The rank of criterion j
r	The rank of alternative k

289

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
 294 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.

$$Z \leq i (j (r (W_{ijk}^r - W_{ijk}^{r+1}))) \quad \forall i, j, k \text{ and } r$$

$$Z \leq \sum_{i=1}^p \sum_{j=1}^n \sum_{k=1}^m W_{ijk}^m \quad \forall i, j \text{ and } k$$

$$\sum_{i=1}^p \sum_{j=1}^n \sum_{k=1}^m W_{ijk} = 1 \quad (1)$$

$$\sum_{i=1}^p \sum_{j=1}^n \sum_{k=1}^m W_{ijk} = 1$$

$$i=1 \quad j=1 \quad k=1$$

$$W_{ijk} \geq 0 \quad \forall i, j \text{ and } k \quad \text{where } Z: \text{Unrestricted in}$$

sign

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

$$W_k = \sum_{i=1}^p \sum_{j=1}^n W_{ijk} \quad \forall k \quad (2)$$

$$i=1 \quad j=1$$

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

$$W_j = \sum_{i=1}^p \sum_{k=1}^m W_{ijk} \quad \forall j \quad (3)$$

$$i=1 \quad k=1$$

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

$$W_i = \sum_{j=1}^n \sum_{k=1}^m W_{ijk} \quad \forall i \quad (4)$$

$$j=1 \quad k=1$$

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

301
 302 **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

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

310 Experts in this research find that poultry farmers' unions and associations in Mashhad are
 311 crucial for poultry entrepreneurship due to their role in information exchange, resource
 312 procurement, and understanding market challenges. These organizations help reduce
 313 production costs, improve access to quality resources, and foster an entrepreneurial culture.
 314 This supports findings by Karami and Agahi (2018), who noted that cooperatives and supplier
 315 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
 321 entrepreneurs in the poultry industry. It may even lead entrepreneurs to fear a lack of input,
 322 discouraging them from initiating new businesses. In this regard, reference can be made to
 323 (Zaghari, 2018), which identifies poultry nutrition and the shortage of production inputs as one
 324 of the main challenges in poultry farming in Iran.

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

SWOT factors	SWOT sub-factors	Weight	Rank ²	Overall Rank
Strengths (S)	S1 High market share	0.9027	2	12
	S2 Presence of significant technical knowledge and specialized human resources in the poultry sub-sector	0.7750	4	14
	S3 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

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.

Weakness (W)	W1	Insurance coverage shortages and weaknesses in support programs during crisis conditions	0.9789	2	3
	W2	Lack or insufficiency of poultry product processing and storage industries	0.9552	4	6
	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
	W6	Low capacity for the production of inputs in the country and a shortage of poultry inputs	0.9813	1	2
Opportunities (O)	O1	Proximity to the border for exports	0.9662	1	4
	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
Threats (W)	T1	Sanctions on the country and difficulties in obtaining equipment such as drugs, vaccines, and technology transfer	0.6808	3	15
	T2	Fluctuations in raw material prices	0.9853	1	1
	T3	Market imbalance and inefficiency of supportive policies for production	0.9196	2	10
	T4	Existence of contagious avian diseases	0.1863	4	17

325 Source: research findings.

326

327 According to the results of the OPA approach for evaluating the matrix of external factors,
 328 it is evident that, as per the experts' opinions, the highest priority among the four identified
 329 opportunities for entrepreneurial development in the poultry subsector is attributed to the
 330 proximity to borders for exports (O1). This criterion has been assigned the highest ranking with
 331 a score of 0.9662. Proximity to borders creates new export opportunities and encourages
 332 producers to optimize production by adhering to international standards, which enhances
 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
 336 has found that changes in international trade market dynamics in Vietnam and access to export
 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 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
 343 marketability and competitiveness. This is particularly challenging for new entrepreneurs and
 344 small businesses in the poultry industry. As a result, these price changes can dampen investment
 345 decisions, entrepreneurial enthusiasm, and business development strategies. In this regard, the
 346 findings of the study by Shoofiyan *et al.* (2022) also demonstrated that price fluctuations in
 347 commodities (such as chicken feed or vaccines/boosters) have resulted in increased costs and
 348 impact the activities of the supply chain.

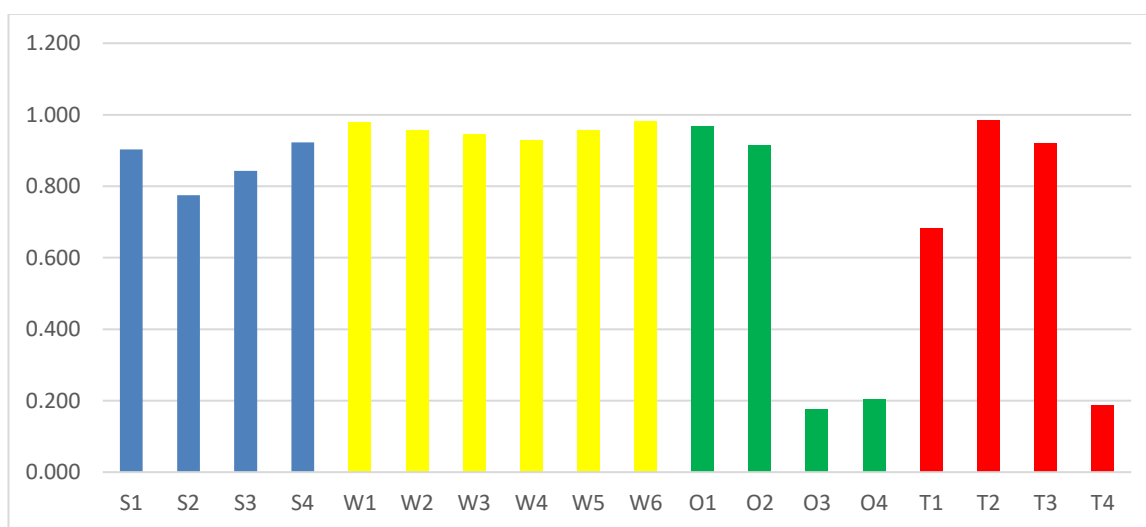


Figure 4. Overall ranking of criteria (sub-factors within the SWOT analysis).

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

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

360

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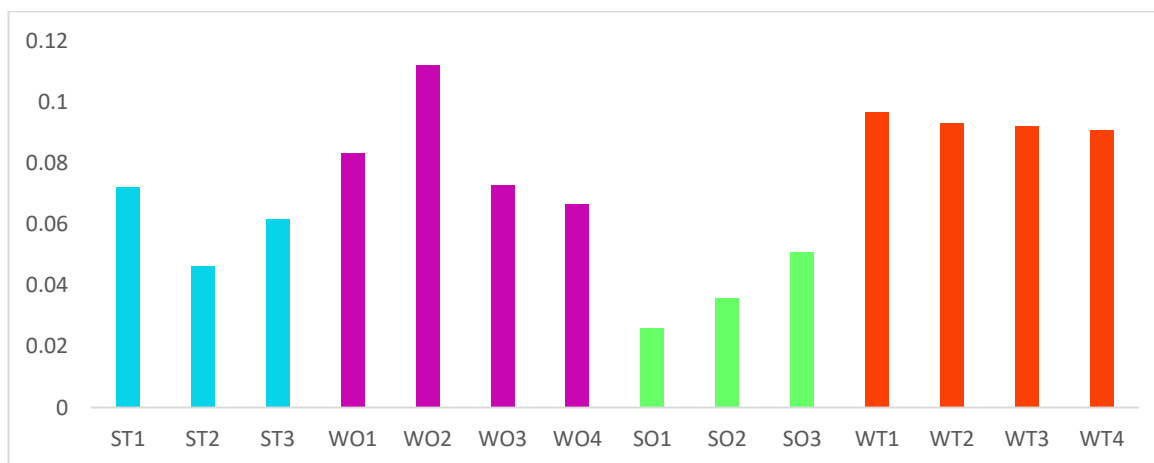
Table 5. Entrepreneurship development strategies ranking in the poultry subsector using the OPA technique.

Strategies	Weight	Rank
ST1	0.0722	8
WO1	0.0833	6
WO2	0.1119	1
SO1	0.0260	14
WT1	0.0968	2
WT2	0.0931	3
WO3	0.0728	7
ST2	0.0463	12
WT3	0.0921	4
ST3	0.0615	10
WO4	0.0666	9
SO2	0.0359	13
SO3	0.0507	11
WT4	0.0907	5

364 Source: research findings.

365 As depicted in Table (5), this study suggests four defensive strategies, three offensive strategies,

366 three competitive strategies, and four conservative strategies.

**Figure 5.** Overall ranking of strategies.

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

373 entrepreneurship development strategies in the poultry subsector include:

374 **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
381 strategies in other sectors, where gradual privatization under regulatory oversight has improved
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**
394 **inputs (WT1)**

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

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

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

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
408 (Doan, 2022). In this regard, Shoofiyan *et al.* (2022) also emphasized that new entrants in the
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, Subagja *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)**

416 Insurance coverage can support producers against economic losses resulting from various
417 factors such as natural disasters, diseases, or market fluctuations (Alam *et al.*, 2020). Insurance
418 provides compensation to poultry farmers in Iran if the entire farm stock (flock) is lost, which
419 can diminish the motivation of entrepreneurs in the poultry sub-sector. In general, increasing
420 insurance coverage in the poultry industry (Payment of indemnity in case of losses and damage
421 to a percentage of the flock) can create a more secure environment for entrepreneurs,
422 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.

434

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

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

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

443

444 **Rank 7: Diversifying income streams (WO3)**

445 Diversifying income streams in the poultry industry through multiple sources, like meat and
446 egg sales or innovative technologies, reduces risks and increases business resilience. This
447 strategy enhances competitiveness, attracts new customers, and strengthens market position,
448 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). Aqajani *et al.* (2008) emphasized in their
457 study that implementing entrepreneurial ideas requires an understanding of prerequisites, which
458 can be achieved through organizing exhibitions and conferences.

459

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

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

467

468 **Rank 10: Market Research (ST3)**

469 When entrepreneurs have a clear understanding of market needs and opportunities through
470 market research, they can tailor their poultry-related ventures to meet those demands more
471 effectively, enhancing the entrepreneurship landscape in the sector. Identifying innovative
472 opportunities and assessing market demand ensures successful product supply, supporting the
473 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 risk-**
483 **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
491 **Rank 12: Implementing biosecurity measures (ST2)**

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

499
500 **Rank 13: Conducting workshops and training courses for entrepreneurs in this field**
501 **(SO2)**

502 Workshops provide entrepreneurs with market insights and specialized knowledge, enhance
503 their confidence and decision-making abilities, and offer motivation for successful business
504 investments (Galvão *et al.*, 2020). So, empowering individuals through enhancing their
505 knowledge and skills levels in performing activities leads to development (Abdollahi Kalourazi
506 *et al.*, 2020). Furthermore, Karami and Agahi (2018) stated that if creativity and innovation in
507 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.

520 By amalgamating these approaches, one can improve the advancement of entrepreneurship in
521 the poultry sector, consequently fostering the generation of economic prospects and augmenting
522 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,
528 utilization of innovative technologies, improvement of animal welfare, investment in
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
548 the challenges faced by poultry producers, utilizing these companies for developing new inputs
549 is crucial. Therefore, it is recommended to create platforms for communication between
550 knowledge-based companies and poultry producers to facilitate technology transfer.
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**

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

561 **4. Organizing Workshops and Training Courses for Entrepreneurs** The findings of this
562 study can have practical implications for producers in the poultry sub-sector, such as organizing
563 workshops and training courses. These initiatives can boost the confidence and motivation of
564 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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