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Agricultural Start-up Ecosystem: A Model of Entrepreneurial Ecosystem in Iran

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16 Abstract

A sustainable entrepreneurial ecosystem is developed and expanded with an emphasis on 17 innovation-based entrepreneurship in emerging Start-ups. This phenomenon requires 18 identifying the influencing factors in this process. This study aimed to analyze the agricultural 19 20 start-up ecosystem in order to provide a model of the entrepreneurship in Iran. A survey research method was applied to achieve research objectives. The population of the study 21 consisted of managers of agricultural Start-up of Iran, (N=90). The questionnaire was the main 22 instrument to collect data. Confirmatory factor analysis and structural equation modeling were 23 used to analyze the data. In total, the research results showed that 9 constructs and 131 sub-24 constructs can explain 82.1 percent the variance of entrepreneurial sustainability in agricultural 25 26 Start-ups. Based on the obtained results, the overall goodness of fit statistics showed that the structural model fits well with the data. The planners of the agricultural entrepreneurship sector 27 28 can play an effective role in smoothing the development path of agricultural entrepreneurship in Start-ups by using the results of this study and considering the identified factors. 29

Keywords: Agricultural Start-up, Employment, Entrepreneurship, Innovation, Iran,
 Sustainable Development.

33 Introduction

Agriculture is the key to development in the field of human civilization (Sharma et al., 2022; Anthony et al., 2014; Loizou et al., 2019). This section is important source of business and commercial activity that has always absorbed a significant part of the labor force (Norouzi et al., 2023). In Iran, like in other developing countries, agriculture is one of the most important economic sectors and includes a high percentage of production and employment. Examining the past events, the climate situation, the current employment situation and urbanization clearly

shows that the share of the agricultural sector in the national gross product has increased in 40 recent years and the growth of this sector has been positive unlike other sectors. Therefore, 41 considering that this sector is a job creator, provider of food security and development of the 42 country, it is very necessary (Vahdati & Sarikhani, 2020). Considering the existence of 43 unemployment problems in Iran, the agricultural sector plays an important role in reducing this 44 problem (Hekmat, 2011). With the development of start-up jobs in the agricultural sector, which 45 emphasizes innovation and technology, the problem of unemployment will be reduced to a 46 significant extent. A country's economy flourishes when the ground is provided for innovation 47 and presence in competitive global markets (Alizadeh et al., 2022). Moving towards innovation 48 and making changes in the mix of products and services is a topic that is discussed in the field 49 of start-up business. Start-up business plays an essential role in creating employment in Iran 50 and accelerates the economic cycle, so efforts should be made to remove the obstacles and 51 52 problems facing this issue (Nabiuny et al., 2021). In this regard, one of the elements of entrepreneurship development is to focus on the growth of start-ups (Norouzi et al., 2023). A 53 startup is a human institution that creates a new product or service in conditions of great 54 55 uncertainty (Blank and Dorf, 2012). Agricultural startup is an institution that tries to increase the productivity and efficiency of agriculture by using new ideas and technologies (Norouzi et 56 al., 2023). 57

According to the conducted research, there are many obstacles for the creation and development 58 of agricultural start-ups in Iran. The most important of them are the low attractiveness of 59 activities in the agricultural sector to attract capital, thinking of high costs and low profit 60 margins of activities related to agriculture, mismanagement, lack of recognizing the priorities 61 of the agricultural sector, and the inability of the government information system to serve idea-62 oriented agriculture projects and failure to make strategic decisions for progress in the 63 agricultural sector (Naderi et al., 2016a). In another research, the same researchers found 64 solutions to overcome the obstacles of Start-up agricultural businesses, including the 65 66 introduction of agricultural businesses to the relevant government institutions by the Science 67 and Technology Park, the support of related organizations such as the Agricultural Jihad, the Deputy Food and Drug Administration for the provision of basic equipment, adjustment in 68 69 policies and macro decisions in the field of agriculture, financial support from governmental and non-governmental institutions to provide capital in the sector of agricultural Start-up 70 71 businesses (Naderi et al., 2016b). In the current situation, due to the pandemic of Covid-19, 72 climate change, and the energy crisis caused by the war in Russia and Ukraine, the food system 73 is weakened globally (Allam et al., 2022). Along with the mentioned issues, population growth

and a 70% increase in the need for food should also be considered (FAO, 2018). In addition to 74 food system crises, population growth, high agricultural waste has also reached a significant 75 level. About one third of food is wasted in the chain of production to consumption (Lindgren 76 et al., 2018). Paying attention to agricultural start-ups in the field of using smart methods and 77 alternatives can have an effective role in increasing productivity and food security (Moro-78 Visconti, 2021). Agricultural start-ups play a fundamental and important role in business model 79 innovation and entrepreneurship development (Mendes et al., 2022). Today, due to the high 80 risk of businesses and the desire to use new technologies, agricultural start-ups have developed 81 82 and expanded significantly and provided the necessary conditions for the development of entrepreneurship based on innovation (Aliabadi et al., 2022). Tiwari et al., (2021) found that 83 startups have a positive impact on creating an entrepreneurial ecosystem. An entrepreneurial 84 ecosystem is a whole that enables the rapid flow of talent, information, and resources, helping 85 86 entrepreneurs quickly find what they need at each stage of growth. As a result, the whole is greater than the sum of its parts (Robertson et al., 2020). The purpose of this research is 87 88 designing an agricultural start-up ecosystem in order to provide a model of the entrepreneurial ecosystem in Iran, so that it can be used to increase the sustainability of entrepreneurship in 89 agricultural activities. By evaluating various researches in the field of entrepreneurship, we 90 came to the conclusion that no research has been done regarding agricultural startups and their 91 relationship with the creation and development of the entrepreneurial ecosystem. For this 92 reason, there is a research gap in this field, and it is necessary to carry out various researches in 93 this regard. 94

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96 Literature review

Yousefi et al., (2016) in a research identified the factors affecting the creation and development 97 of agricultural start-ups, which include the low budget of the government to pay attention to 98 99 new ideas in agricultural activities, the inappropriate process of information flow and 100 communication to provide idea-oriented products to farmers, lack of interest in the idea-101 oriented agricultural market and little investment to turn the idea into a product. Dai and Si (2018) concluded, the relationship between government policies and the entrepreneurial 102 103 orientation of public institutions and private companies has been a controversial topic in entrepreneurship research. Barba-Sánchez and Atienza-Sahuquillo (2012) concluded that 104 behavioral drivers have an effective role in entrepreneurial behavior. The need for success, 105 motivation, self-awareness, independence, dependence and competence are the most important 106 107 behavioral motivators. Adeel et al., (2023) concluded that attitudinal motivators have an

effective role on the development and sustainability of entrepreneurship. Kakani et al., (2020) 108 believed that technology-based start-ups focusing on agribusiness solutions are looking for 109 specific solutions to improve yields and increase productivity and achieve the goal of 110 sustainable food supply for decades to come. Tiwari et al., (2021) found that start-ups have had 111 a positive effect in reducing regional entrepreneurial disparities but have been less successful 112 due to the lack of financial support and funding. Results of their research indicated that macro 113 intervention factors were of greater importance in a sustainable start-up ecosystem. Aliabadi et 114 al., (2022) explained sustainable entrepreneurial ecosystem focuses on sustainable development 115 116 and how entrepreneurs can work to achieve innovative, risky, and profitable entrepreneurial activity while maintaining economic, environmental, social, and cultural factors. Results of 117 their research indicated that ecological, economic, social and institutional dimensions were of 118 greater importance in a sustainable start-up ecosystem. The results of applying the cross-impact 119 120 analysis method reveal that employment, business ownership and scale, income and saving, reforming laws, access to information, the existence of NGOs, and awareness and 121 122 understanding of risk are among the factors affecting the system sustainability. These Start-ups have great potential to change the agricultural sector by increasing technologies that help 123 increase productivity in this field, related to reducing environmental and social costs in 124 production methods (Mendes et al., 2022). Martínez Campoverde and Vega Abad (2023) in 125 study of start-ups to innovate agricultural production in Ecuador concluded in Ecuador, start-126 ups have had a remarkable growth in the last decade due to the extensive amount of benefits 127 they offer by using current technologies in the provision of a service or within production 128 processes such as in agriculture, therefore it is considered necessary to describe them and show 129 what systems they use in favor of innovation and increased agricultural production. Norouzi et 130 al., (2023) showed "slowness of processes in the public sector and lack of innovation", 131 "numerous regulations related to the issuance of entrepreneurial licenses", "lack of supportive 132 133 law for the development of Start-ups in the ecosystem", and "government monopoly on the supply of some agricultural inputs required for the Start-ups activities" are the most important 134 135 threats of the Iranian Agriculture Start-ups ecosystem. Therefore, based on the results of the aforementioned research, agricultural ecosystems can play an effective role in the development 136 137 and improvement of the entrepreneurial environment and professional development. The main 138 reason for conducting this research is how we can turn the agricultural startup ecosystem into an entrepreneurial environment and what internal, external, micro and macro factors should be 139 paid attention. The conceptual framework that showed in Figure 1, is extracted from the results 140 141 of various researches from literature review (Table 1).

Table 1. Extracted	components and their oper-	ational definition based on their indicators
Components	References	Operational definition based on their indicators
Behavioral	(Barba-Sánchez and	Income generation, government support, self-
Motivators	Atienza-Sahuquillo, 2012;	confidence, new opportunities,
	Dai and Si, 2018;	job creating, social status, success, free services,
	Aliabadi et al., 2022)	product development
Attitudinal	(Aliabadi et al., 2022;	Minimize risk, marketing, innovation, funds,
motivators	Adeel et al., 2023;	culture, sprit, knowledge, counseling, education,
	<u>Norouzi et al., 2023)</u>	experience
Social constructs	(Lang and Fink, 2019;	Participation, group work, connections,
	Tuatul Mahfud et al., 2020;	community, institutionalization, education
	Aliabadi et al., 2022)	
Economical	(Nabiuny et al., 2021;	Income, working capital, incentives, export,
constructs	Aliabadi et al., 2022; Tahir	market, added value, facilities, costs
	and Burki 2023)	
Environmental	(Dai and Si, 2018; Aliabadi	Climate change, education, institutions, experience,
potentials	et al., 2022;	innovations, skills, technology parks, access to
	Adeel et al., 2023;	market, human power, guidelines
	Norouzi et al., 2023)	
Intergroup social	(Lang and Fink, 2019;	Communication, motivation, association,
capital	Aliabadi et al., 2022)	participation, risk-taking, education, law,
		efficiency, suggestion system
Educational strategy	(Ratten and Jones, 2021;	Problem solving, creativity, innovation, education,
	Tuatul Mahfud et al., 2020;	acquaintance with different institute, startup skills,
	Lang and Fink, 2019;	familiarity with laws, budgeting, localization,
	Aliabadi et al., 2022)	micro and macro planning, marketing,
		productivity, efficiency, banking facilities, ICT
Macro intervening	(Tiwari et al., 2021; Yousefi	Investment, consulting services, export standard,
tactors	et al., 2016;	bureaucracy, market, customer welcome, access to
	Alizadeh et al., 2022)	equipment, services institutes
Micro intervening	(Tiwari et al., 2021;	Age, skills, experiences, freedom, diagnosis,
factors	Tuatul Mahfud et al., 2020;	judgment, sprit
	Lang and Fink, 2019;	
	Aliabadi et al., 2022)	
Entrepreneurship	(Aliabadi et al., 2022;	Innovation investment, facilities, support owner of
sustainability	Norouzi et al., 2023;	technology idea, education and training, financial
	Mendes et al., 2021;	assistance, legal permits
	Tiwari et al., 2021)	



154 Methodology

A survey research method was applied to achieve research objectives. The population of the 155 study consisted of managers of agricultural Start-up of Iran, (N=90). All statistical population 156 was studied by census. Out of the total number of managers, 35 managers worked in the field 157 of agricultural production, 30 managers in the field of product processing, and 25 managers in 158 the field of sales and marketing. The way to contact and communicate with them was through 159 e-mail, phone call, and Eitaa and Telegram messengers. Finally, 90 managers were contacted 160 and data was collected. The questionnaire was the main instrument to collect data. The validity 161 was determined by a panel of experts. The minimum Cronbach's alpha coefficient for the factors 162 was equal to 0.81 (Table 2). First section included items about demographic characteristics. 163 Second part explained the main determining factors of the agricultural Start-up ecosystem that 164 affect the sustainability of entrepreneurship, by 131 items (Table 2). Part three indicated 165 sustainability of entrepreneurship in agricultural start-ups by 10 statements. The scale used in 166 part two and three was Likert scale (1=very low, 2=low, 3=average, 4= high, 5= very high). 167 Structural equation modeling was used to analyze the data. Structural Equation Modeling 168 (SEM) was used to test for the direct, indirect and mediating effects of the factors variables in 169 the prediction of sustainability of entrepreneurship in agricultural start-ups. According to Torfi 170 171 et al., (2023), it is appropriate to adopt a two-step approach for SEM: first, assessment of the measurement model; second, assessment of the structural model. 172

173 Table 2. The Cronbach's alpha coefficient for the factors and the number of items of each factor.

Factors of the agricultural Start-up ecosystem	Number of Items	Cronbach's alpha coefficient
Behavioral motivators	10	0.94
Attitudinal motivators	23	0.91
Social constructs	10	0.86
Economical constructs	16	0.92
Environmental potentials	14	0.86
Intergroup social capital	16	0.81
Educational strategy	23	0.86
Macro intervening factors	12	0.94
Micro intervening factors	7	0.88
Entrepreneurship sustainability	10	0.92

174

175 Results and discussion

176 Demographic characteristics of the respondents.

The respondents' age showed that 40% were between 40-50 years and the average age was
44.26 years. Also, 55.56% of the respondents had Ph.D degrees and 44.4% had MSc. Moreover,

the position of 83.3% of the respondents were manager and 32.2% of them had managerialexperience between 1-5 years.

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182 Entrepreneurial Ecosystem in Agricultural Start-Up

Entrepreneurial ecosystems include determinants whose performance determines the business 183 path, success and sustainability of the ecosystem. Especially in the case of start-up businesses 184 that operate with a high degree of technological innovation and service delivery (Ziakis et al., 185 2022). Considering the critical effect that domestic and foreign investments have on the national 186 and international economy, understanding what motivates entrepreneurs is both practical and 187 theoretically important. Although research on the factors and outcomes of entrepreneurial 188 motivation has developed rapidly, it has evolved into distinct theoretical silos where 189 entrepreneurs tend to separate motivations by stage of business development to acknowledge 190 that individuals often go through all of these stages go through and experience different types 191 of motivations during their entrepreneurial process. Social, economic and individual 192 motivations play an effective role in this field (Murnieks et al., 2020). This is more important 193 in agricultural start-ups in terms of social, economic and cultural infrastructure. In this research, 194 the main determining factors of the agricultural Start-up ecosystem that affect the sustainability 195 196 of entrepreneurship have been analyzed.

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198 Behavioral motivators

In the study of behavioral motivators, 10 items were examined and the managers were asked to 199 express the behavioral motivations for the sustainability of entrepreneurship in agricultural 200 201 start-ups. Based on the rank average, the most important behavioral motivation was obtained. Generating income, discovering new opportunities, and improving social status were ranked 202 203 first to third (Figure 2). Barba-Sánchez and Atienza-Sahuquillo (2012) explained certain reasons have more influence on entrepreneurial behavior, such as the need for achievement, 204 self-realization, independence, affiliation, competence, power and making money or being 205 206 one's own boss



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Figure 2. Behavioral motivations for the sustainability of entrepreneurship in agricultural start ups.

211 Attitudinal motivators

In the study of attitudinal motivators for the sustainability of entrepreneurship in agricultural 212 start-ups, 23 items were taken into consideration and company managers were asked to express 213 214 their opinion about these items. Based on the rank average, the most important attitudinal 215 motivations were obtained. Investment for young generations, academic education, and availability of suitable technologies were ranked first to third (Figure 3). Adeel et al., (2023) 216 concluded, people who have more prior knowledge, entrepreneurial awareness, opportunity 217 recognition, entrepreneurial motivation and entrepreneurial intention show more 218 219 entrepreneurial behavior. In addition, people who participated in entrepreneurship education perform differently than people who did not receive any entrepreneurship education. 220 221 Specifically, people who enroll in entrepreneurship education are more likely than others to use 222 prior knowledge and awareness to identify new business opportunities and align their 223 motivations to start a new venture.



- Figure 3. Attitudinal motivators for the sustainability of entrepreneurship in agricultural start-ups.
- 228 Social constructs

In the study of social constructs for the sustainability of entrepreneurship in agricultural start-229 ups, 10 items were examined. Desire for an educated workforce, entrepreneurial culture and 230 exchange of knowledge and information were ranked first to third (Figure 4). Song et al (2020) 231 explained social security has a positive effect on the technology-based entrepreneurial activity. 232 Tuatul Mahfud et al (2020) revealed that entrepreneurial attitude orientation, social capital, and 233 psychological capital collaboratively and interactively influence the entrepreneurial intention. 234 Psychological capital was shown to have a positive partial mediation effect on the relationship 235 between entrepreneurial attitude orientation and entrepreneurial intention. Finally, 236 237 psychological capital was also found to fully mediate the impact of a social capital on 238 entrepreneurial intention.

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Entrepreneurial culture

Figure 4. Social constructs for the sustainability of entrepreneurship in agricultural
 start-ups.

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244 Economical constructs

In the study of economical constructs for the sustainability of entrepreneurship in agricultural 245 start-ups, 16 items were examined, appropriate facilities, attracting the required financial 246 resources and supplying inputs at a low cost were ranked first to third (Figure 5). Tahir and 247 248 Burki (2023) explained that entrepreneurship has a positive and significant effect on economic 249 growth in emerging economies. The relationship between human capital and economic growth 250 for BRICS economies is both positive and statistically significant. Finally, the causality test showed a unidirectional relationship from entrepreneurship to economic growth. According to 251 the results obtained in this study, encouraging young people to pursue entrepreneurial careers 252 is likely to help solve the problem of youth unemployment in BRICS economies. 253



Figure 5. Economical constructs for the sustainability of entrepreneurship in agricultural
 start-ups.

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261 Environmental potentials

Based on the results in Figure 6, 14 items were examined in the field of environmental potential 262 for the sustainability of entrepreneurship in agricultural start-ups. Company managers were 263 asked to express the effectiveness of these items. The obtained results showed that the managers 264 considered the most important potential to be mandatory government guidelines, access to 265 market and inputs and establishment in science and technology parks were ranked first to third. 266 Dai and Si (2018) concluded, the relationship between government policies and the 267 entrepreneurial orientation of public institutions and private companies has been a controversial 268 269 topic in entrepreneurship research.



Figure 6. Environmental potential for the sustainability of entrepreneurship in agricultural start-ups.
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274 Intergroup social capital

In the study of effective intergroup social capital for the sustainability of entrepreneurship in 275 agricultural start-ups, 16 items were examined. Managers were asked to express the impact of 276 each item on the improvement process. The obtained results showed that the items visiting 277 successful companies, successful training programs and motivation promotion programs were 278 ranked first to third (Figure 7). The entrepreneurship and social capital literature in recent years 279 has highlighted the innovative and problem-solving capacity of social entrepreneurs as new 280 281 positions that seek to solve socio-economic problems in rural areas and induce sustainable 282 change (Lang and Fink, 2019)

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Figure 7. Intergroup social capital for the sustainability of entrepreneurship in agricultural
 start-ups.

289 Educational strategy

In Figure 8, the effective educational strategies of sustainability of entrepreneurship in 290 agricultural start-ups were examined in the form of 23 items. Managers were asked to determine 291 the effectiveness of each strategy. The obtained results showed that the managers consider 292 teaching how to use banking facilities to be the most important educational strategies, and the 293 294 next priorities are training of initial Start-up skills, training to improve productivity, and teaching legal issues of companies. Ratten and Jones (2021) believed entrepreneurship 295 education is one of the most popular management education subjects due to its ability to link 296 297 practice with theory.

Mean





Figure 8. Educational strategies for the sustainability of entrepreneurship in agricultural start-ups.

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302 Macro intervening factors

Based on the results of Figure 8, 12 items were taken into consideration in the investigation of macro intervening factors affecting the sustainability of entrepreneurship in agricultural startups. Managers were asked to determine the impact of these items. The obtained results showed that the most important intervening factors were performing management consulting services and the next priorities are creating service institutions to facilitate the development of companies and access to appropriate equipment to start the company.

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Figure 9. Macro intervening factors for the sustainability of entrepreneurship in agricultural
 start-ups.

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320 Micro intervening factors

In the investigation of micro-intervening factors effective on the sustainability of entrepreneurship in agricultural start-ups, 7 items were investigated. The results obtained from the prioritization of these intervening factors showed that the high level of risk-taking spirit among managers is the most important intervening factor, and work experience and several types of skills and abilities are among the next priorities (Figure 10).



Figure 10. Micro intervening factors for the sustainability of entrepreneurship in agriculturalstart-ups.

331 Entrepreneurship sustainability indicators in agricultural start-ups

In the study of sustainability of entrepreneurship in agricultural start-ups, 10 indicators raised in theoretical studies and interviews with elites were taken into consideration. The results showed that the most important indicator is providing low interest loans to entrepreneurs and the next priorities are investment and necessary financing through innovation investment funds and assistance in obtaining loans and entrepreneurship facilities (Figure 11).







339 Structural equation modeling (SEM)

In this research, SEM has been used to identify the direct and indirect effects of the factors on the sustainability of entrepreneurship in agricultural start-ups. The results of confirmatory factor analysis showed the initial measurement model to provide an acceptable fit for the data $(X^2=2.04; GFI=0.98; TLI=0.94; CFI =0.96; IFI=0.92; RMSEA=0.052)$. Therefore, the measurement model provided a reasonable fit (Table 3). Thus, the hypothesized model was judged suitable for the SEM.

Table 3. Summary of Goodness of Fit Indices for the Measurement Model.									
Fit indices	X^2	Р	GFI	CFI	TLI	IFI	RMSEA		
Value in study	2.04	0.02	0.98	0.96	0.94	0.92	0.052		
Suggest value	-	>0.05	>0.80	>0.90	>0.90	>0.90	< 0.08		

Goodness of Fit Index (GFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Incremental Fit Index (IFI),
Root Mean Square Error of Approximation (RMSEA).

350 **Convergent Validity:**

- Convergent validity of the measurement model indicates that the observed variables that define the same latent variable should have a relatively high correlation as assessed by the factor loadings. Generally, values of at least 0.3 to 0.5 are interpreted as acceptable and greater than 0.5 to 0.7 as good, while values greater than 0.7 are interpreted as very good (Kang and Ahn, 2021). The results in Table 2 show the t-value for the factor loadings to all exceed 4 (p < 0.01) and the standardized factor loading to all have values greater than 0.6. This shows good convergent validity for the constructs of this study.
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359 Construct Reliability (CR):

Construct reliability measures how well variables underlying constructs served in structural equation modelling. In SEM construct reliability is depicted using confirmatory factor analysis (CFA). Composite reliability is estimated based on the factor loading analysis (Lerdpornkulrat et al., 2017). It is allowed to have a build reliability coefficient greater than 0.70. A value of CR \geq 0.7 is required to achieve construct reliability (Tentama & Anindita, 2020). As shown in Table 2, all of the constructs had CR which were greater than the recommended 0.70. The result is a good composite or CR for the constructs measured in this study.

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368 Discriminant validity:

Based on the results in table 4, the square root of the AVE estimate for each construct is greater than the correlation between it and all other construct in the model. This means that the indicators have more in common with the construct that they are associated with the other constructs. Thus, discriminant validity has been showed for the constructs in the measurement model.

375 Assessment of the structural model:

From table 4 and figure 12, it can be found that the predictive positive effect of BM (β =0.612, 376 t-value=4.532, p<0.001), AM (β=0.584, t-value=5.124, p<0.001), SC (β=0.612, t-value=4.854, 377 p<0.001), EC (β=0.819, t-value=5.065, p<0.001), EP (β=0.587, t-value=4.085, p<0.001), ISC 378 $(\beta=0.612, t-value=5.089, p<0.001)$, ES $(\beta=0.681, t-value=9.012, p<0.001)$, MaIF $(\beta=0.576, t-$ 379 value=5.018, p<0.001) and MiIF (β =0.641, t-value=3.945, p<0.001) on the sustainability of 380 entrepreneurship in agricultural start-ups. Based on the research results presented in Table 2, 381 the amount of R^2 =0.812 was estimated. This indicates that 9 constructs and 131 sub-constructs 382 383 have the ability to explain 81.2% of the sustainability of entrepreneurship in agricultural start-

- ups variance. Based on the results obtained, the overall goodness of the fitting statistics showed
- that the structural model is well consistent with the data.
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Table 4. Results of Confirmatory Factor Analysis for the Measurement Model and the Effectsof Constructs on Outcome.

Constructs	CR	AVE	Outcome	Path	t-value	R ²
				coefficient		
Behavioral Motivators	0.754	0.83		0.612	4.532	
Attitudinal Motivators	0.762	0.85		0.584	5.124	
Social Constructs	0.858	0.82	Sustainability of	0.612	4.854	
Economical Constructs	0.895	0.84	entrepreneurship in	0.819	5.065	
Environmental Potentials	0.767	0.85	agricultural start-	0.587	4.085	0.812
Intergroup Social Capital	0.861	0.84	ups	0.612	5.089	
Educational Strategy	0.785	0.81		0.681	9.012	
Macro Intervening Factors	0.845	0.92		0.576	5.018	
Micro Intervening Factors	0.834	0.91		0.641	3.945	

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Table 5. Means, SD and Correlations with Square Roots of the AVE.

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	Mean	SD	BM	AM	SC	EC	EP	ISC	ES	MaIF	MiIF
BM	3.87	0.81	0.83 ^a								
AM	3.95	0.92	0.81**	0.85 ^a							
SC	3.84	0.84	0.73**	0.74**	0.82 ^a						
EC	4.06	0.85	0.69**	0.69**	0.81**	0.84 ^a					
EP	3.92	0.81	0.75**	0.71**	0.80**	0.79**	0.85 ^a				
ISC	3.95	0.98	0.73**	0.72**	0.73**	0.74**	0.75**	0.84 ^a			
ES	4.06	0.82	0.81**	0.78**	0.71**	0.75**	0.72**	0.77**	0.81 ^a		
MaIF	4.08	0.84	0.79**	0.74**	0.70**	0.74**	0.82**	0.82**	0.84**	0.92 ^a	
MiIF	3.98	0.87	0.69**	0.69**	0.81**	0.75**	0.70**	0.74**	0.72**	0.74**	0.91 ^a

392 **Correlation is significant at the <0.01 level

^a:The square roots of AVE estimates, AVE: Average Variance Extracted.



Figure 12. Path Model with Standardized Factor Loadings. SEAS: Sustainability of
Entrepreneurship in Agricultural Start-Ups; BM: Behavioral Motivators; AM: Attitudinal
Motivators; SC: Social Constructs; EC: Economical Constructs; EP: Environmental Potentials;
ISC: Intergroup Social Capital; ES: Educational Strategy; MaIF: Macro Intervening Factors,
MiIF: Micro Intervening Factors

404 Conclusion

Creation and expansion of agricultural start-ups for the development of entrepreneurship is 405 406 a multi-dimensional issue. Analyzing the agricultural Start-up ecosystem will play an important role in entrepreneurship and employment. The results of the analysis showed that the most 407 408 important behavioral motivation that has an effect on the sustainability of entrepreneurship in 409 agricultural start-ups includes generating income, discovering new opportunities, and 410 improving social status that were ranked first to third. Therefore, it is very important for the 411 government sector to facilitate income generation and provide the necessary conditions for 412 discovering new sources of income and efforts to strengthen the social position of startups in the agricultural sector. Also, the important attitudinal motivations in this regard were include 413 414 investment for young generations, academic education, and availability of suitable technologies 415 that were ranked first to third. Therefore, providing the necessary facilities to strengthen the attitude of people regarding working in startup companies will play an effective role in 416

attracting creative and innovative youth and will strengthen the motivation and spirit of hope 417 in the society. In addition, the social constructs that were effective on sustainability were 418 identified. The most important of them included desire for an educated workforce, 419 entrepreneurial culture and exchange of knowledge and information, which were ranked first 420 to third. Therefore, the development of entrepreneurial knowledge at the community level and 421 the expansion of entrepreneurial culture with a creative and innovative approach will be the 422 basis for the sustainability of the entrepreneurial ecosystem in startups. Economical constructs 423 were the next factor that was investigated on the sustainability of entrepreneurship in 424 425 agricultural start-ups. The most important economic constructs were appropriate facilities, attracting the required financial resources and supplying inputs at a low cost, which were ranked 426 427 first to third. Therefore, it can be claimed that in the economic field, an action has been taken in the direction of the sustainability of entrepreneurship in startups when the necessary facilities 428 429 for the development of innovation and creativity infrastructures for entrepreneurship have been provided. After the things mentioned in start-up ecosystem, the impact of environmental 430 431 potential for the sustainability of entrepreneurship in agricultural start-ups was investigated. Mandatory government guidelines, access to market and inputs and establishment in science 432 and technology parks as environmental potentials were ranked first to third. Next, visiting 433 successful companies, successful training programs and motivation promotion programs as 434 intergroup social capital were ranked first to third. In the study of educational strategies, it was 435 found that training of initial start-up skills, training to improve productivity, and teaching legal 436 issues of companies had an effective role on the sustainability of entrepreneurship in 437 438 agricultural start-ups. In the following, performing management consulting services, creating service institutions to facilitate the development of companies and access to appropriate 439 equipment to start the activities of the company as macro intervening factors and high level of 440 risk-taking spirit, work experience and several types of skills and abilities as micro intervening 441 442 factors that effect on sustainability of entrepreneurship in agricultural start-ups were identified. In total, the research results showed that 9 constructs and 131 sub-constructs can explain 81.2 443 444 percent of the variance of the sustainability of entrepreneurship in agricultural start-ups. Therefore, taking the necessary measures to improve the influencing variables in the ecosystem 445 of agricultural start-ups provides the necessary potential for the sustainability of 446 entrepreneurship in the agricultural sector and can facilitate the path of agricultural 447 development as a benchmark. Agricultural entrepreneurship planners should take advantage of 448 this gift and use the results of this research to provide the necessary conditions for the 449 450 development of entrepreneurship in the agricultural sector.

452 **References:**

1) Adeel, S., Daniel, A.D., Botelho, A. (2023). The effect of entrepreneurship education 453 on the determinants of entrepreneurial behaviour among higher education students: A multi-454 455 group analysis, Journal of Innovation & Knowledge, 8 (1),100324. 456 https://doi.org/10.1016/j.jik.2023.100324.

457 2) Ahmadinejad, M. (2020). Knowledge Commercialization in Agricultural Higher
458 Education: A Two-Step Approach to Structural Equation Modeling. International Journal of
459 Agricultural Management and Development, 10(2), 149-166.
460 <u>https://ijamad.rasht.iau.ir/article_673811.html</u>

461 3) Aliabadi, V., Ataei, P., Gholamrezai, S. (2022). Identification of the relationships among the indicators of sustainable entrepreneurial ecosystems in agricultural Start-ups, 462 7 Journal of Innovation & Knowledge, (4), 100245, ISSN 2444-569X, 463 https://doi.org/10.1016/j.jik.2022.100245 464

465 4) Aliabadi, V., Ataei, P., Gholamrezai, S. (2022). Identification of the relationships
466 among the indicators of sustainable entrepreneurial ecosystems in agricultural startups. Journal
467 of Innovation & Knowledge, Volume 7, Issue 4, https://doi.org/10.1016/j.jik.2022.100245.

Alizadeh, M., Ommani, A. R., Noorollah Noorivandi, A., Maghsoodi, T. (2022).
Determinants of Eco-Innovations in Agricultural Production Cooperatives in Iran. JAST, 24 (1)
:1-12. <u>http://jast.modares.ac.ir/article-23-48078-en.html</u>

Allam, Z., Bibri, S.E., Sharpe, S.A. (2022). The rising impacts of the COVID-19
pandemic and the Russia–Ukraine War: Energy transition, climate justice, global inequality,
and supply chain disruption, Resources, 11 (11), p. 99-114, <u>https://www.mdpi.com/2079-</u>
9276/11/11/9910.3390/resources11110099

7) Anthony, O., Ifeanyi Ndubuto, N., Ogbonnaya, O. U., & Maria Etomchi, N. (2014). 475 Analysis of Entrepreneurial Behavior among Cassava Farmers in Ebonyi State, 476 Nigeria. International Journal of Agricultural Science, Research and Technology in Extension 477 69-74. 478 and Education Systems (IJASRT in EESs), 4(2),479 https://ijasrt.shoushtar.iau.ir/article_517382.html

8) Barba-Sánchez, V., Atienza-Sahuquillo, C. (2012). Entrepreneurial behavior: Impact of
motivation factors on decision to create a new venture, Investigaciones Europeas de Dirección
y Economía de la Empresa, 18 (2), 132-138, https://doi.org/10.1016/S1135-2523(12)70003-5.
Blank, S. and Dorf, B. (2012). The Startup Owner's Manual, K&S Ranch (publishers), ISBN
978- 0984999309, 12 pp

485 9) Dai, W and Si, S. (2018). Government policies and firms' entrepreneurial orientation:
486 Strategic choice and institutional perspectives, Journal of Business Research, 93, 23-36,
487 https://doi.org/10.1016/j.jbusres.2018.08.026.

10) FAO. (2018). The future of food and agriculture – Alternative pathways to 2050. In
FAO (Ed.), Food and Agriculture Organization of the United Nations (Issue November).
Licence: CC BY-NC-SA 3.0 IGO. <u>https://www.fao.org/3/I8429EN/i8429en.pdf</u>

491 11) Field, A. (2009). Discovering Statistics Using SPSS. Sage: London.

492 12) Hekmat, M. (2011). Entrepreneurship Approaches in Agricultural 493 Cooperatives. International Journal of Agricultural Science, Research and Technology in and Education Systems 494 Extension (IJASRT in EESs), 1(1), 39-45. 495 https://ijasrt.shoushtar.iau.ir/article_517755.html

Kang, H and Ahn, J. (2021). Model Setting and Interpretation of Results in Research
Using Structural Equation Modeling: A Checklist with Guiding Questions for Reporting, Asian
Nursing Research, 15 (3), 157-162, <u>https://doi.org/10.1016/j.anr.2021.06.001</u>.

Lerdpornkulrat, T., Poondej, C., & Koul, R. (2017). Construct reliability and validity of
the shortened version of the information-seeking behavior scale. International Journal of
Information and Communication Technology Education, 13(2), 27–37.
<u>https://doi.org/10.4018/IJICTE.2017040103</u>

Lindgren, E., Harris, F., Dangour, A.D., Gasparatos, A., Hiramatsu, M., Javadi, F.,
Loken, B., Murakami, T., Scheelbeek, P., & Haines, A. (2018). Sustainable food systems—A
health perspective. Sustainability Science (pp. 1505–1517), 13(6).
<u>https://doi.org/10.1007/S11625-018-0586-X/FIGURES/2</u>

Loizou, E., Karelakis, C., Galanopoulos, K and Mattas, K. (2019). The role of
agriculture as a development tool for a regional economy, Agricultural Systems, 173, 482-490,
ISSN: 0308-521X, <u>https://doi.org/10.1016/j.agsy.2019.04.002</u>.

Mahfud, T., Triyono, M. B., Sudira, P & Mulyani, Y. (2020). The influence of social
capital and entrepreneurial attitude orientation on entrepreneurial intentions: the mediating role
of psychological capital, European Research on Management and Business Economics, 26 (1),
33-39, https://doi.org/10.1016/j.iedeen.2019.12.005.

18) Martínez Campoverde, D. J., & Vega Abad, C. R. (2023). Study of Start-ups in the
cloud to innovate agricultural production in Ecuador (IoT, data in the cloud). Journal of
Business and Entrepreneurial Studie, 7(2). <u>https://doi.org/10.37956/jbes.v7i2.327</u>

- 517 19) Mendes, J.A.J., Bueno, L.O., Oliveira, A.Y., Gerolano, M.C. (2022). Agriculture Start-
- 518 ups (Agtechs): Abiblio metric study. International Journal of professional Business Review,
- 519 7(1), 1-18. <u>https://www.openaccessojs.com/JBReview/article/view/312/193</u>
- 520 20) Moro-Visconti, R. (2021). Food Tech and Agri Tech Start-up valuation. In R. Moro521 Visconti (Ed.), Start-up Valuation (pp. 363–390). Springer International Publishing.
 522 https://doi.org/10.1007/978-3-030-71608-0_15
- 523 21) Murnieks, C. Y., Klotz, A.C., Shepherd, D.A. (2020). Entrepreneurial motivation: A
 524 review of the literature and an agenda for future research. Journal of Organizational Behavior,
 525 41 (2), 115-143. https://doi.org/10.1002/job.2374
- 526 22) Nabiuny, E., Bayat, M.R and Aram, F. (2021).The Role of Start-ups in Creating
 527 Employment and the Economic Cycle (Case Study of Iran),1st International Conference on
 528 Industrial Engineering, Management, Economy and Accounting, Tehran, Iran.
 529 <u>https://civilica.com/doc/1220659</u>
- 530 23) Naderi, N., yusefi, Z., & Rezaei, B. (2016a). Phenomenology of barriers to the creation
 531 and launch of agricultural start-ups. Entrepreneurship strategies in agriculture, 3(5), 35-46.
 532 <u>https://jea.sanru.ac.ir/article-1-127-en.html</u>
- 533 24) Naderi, N., yusefi, Z., & Rezaei, B. (2016b). Identify of reduction and overcome
 534 strategies to barriers the creation and launch agricultural Start-ups with a phenomenological
 535 approach. Journal of Technology Development Management, 4(3), 127-150.
 536 <u>https://jtdm.irost.ir/article_571.html?lang=en</u>
- 537 25) Norouzi, A., Sadighi, H., Abbasi, E., Shabanali Fami, H., Mokhtari Aski, h. (2023).
 538 Strategic analysis of Start-up ecosystem in Iran's agricultural sector. Journal of Global
 539 Entrepreneurship Research, 13, (1), 156-175. <u>https://doi.org/10.1007/s40497-023-00346-4</u>
- Norouzi, A., Sadighi, H., Abbasi, E., Shabanali Fami, H., & Mokhtari Aski, H.
 (2023). Strategic analysis of startup ecosystem in Iran's agricultural sector. J Glob Entrepr
 Res, 13 (1), 1-17. https://doi.org/10.1007/s40497-023-00346-4
- 26) Robertson, J., Pitt, L., & Ferreira, C. (2020). Entrepreneurial ecosystems and the public
 sector: A bibliographic analysis, Socio-Economic Planning Sciences, Volume 72, 100862,
 ISSN 0038-0121, <u>https://doi.org/10.1016/j.seps.2020.100862</u>.
- Sharma, B., Lakra, U., Sharma, R and Sharma, S. R. (2022). A comprehensive review
 on nanopesticides and nanofertilizers—A boon for agriculture, Chapter 16, Editor(s): Mansour
 Ghorbanpour, Muhammad Adnan Shahid, Nano-enabled Agrochemicals in Agriculture,
 Academic Press, 273-290, ISBN 9780323910095, <u>https://doi.org/10.1016/B978-0-323-91009-</u>
 <u>5.00026-4</u>.

- Song, C., Park, K. M., & Kim, Y. (2020). Socio-cultural factors explaining technologybased entrepreneurial activity: Direct and indirect role of social security, Technology in Society,
 61, 101246, https://doi.org/10.1016/j.techsoc.2020.101246.
- Tahir, M and Burki, U. (2023). Entrepreneurship and economic growth: Evidence from
 the emerging BRICS economies, Journal of Open Innovation: Technology, Market, and
 Complexity, 9(2), 100088, https://doi.org/10.1016/j.joitmc.2023.100088.
- 30) Tentama, F & Anindita, W. (2021). Employability Scale: Construct Validity and
 Reliability. International Journal of Scientific & Technology Research Volume 9, Issue 04,
 3166-3170.
- 560 31) Tiwari, A., Hogan, T and O'Gorman, C. (2021). The good, the bad, and the ugly of
 561 'Start-up India' a review of India's entrepreneurship policy, Economic and Political
 562 Weekly, 56 (50), 45-52. <u>https://doras.dcu.ie/26570/</u>
- 32) Torfi, K., Ommani, A. R., Noorollah Noorivandi, A., & Sabouri, M. (2023). Application 563 of SEM Analysis for Designing Strategic Model for Agricultural Sustainable Development 564 (ASD) in Iran. International Journal of Agricultural Science, Research and Technology in 565 Systems Extension and Education (IJASRT in EESs), 13(2), 87-102. 566 567 https://ijasrt.shoushtar.iau.ir/article_703434.html
- 33) Vahdati, K., & Sarikhani, S. (2020). An Overview of Sustainable Agriculture
 Development in Iran and in the World. Strategic Research Journal of Agricultural Sciences and
 Natural Resources, 5(1), 19-32. <u>https://srj.asnr.ias.ac.ir/article_113049.html?lang=en</u>
- 34) Yousefi, Z., naderi, N., & rezaei, B. (2017). Factors affecting of the growth of
 agricultural Start-ups. Innovation Management Journal, 5(4), 1-18.
 <u>https://www.nowavari.ir/article_46949.html?lang=en</u>