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Identification of Factors Influencing the Development of Innovations and Inventions in Iranian Sports

Hossein. Asghari Alaei[1], Vahid. Shojaei[2*], Mohammad. Hami[2]

[1] PhD Student in Sports Management, Department of Physical Education, Faculty of Humanities, Sari Branch, Islamic Azad University, Sari, Iran
[2] Associate Professor, Department of Physical Education, Faculty of Humanities, Sari Branch, Islamic Azad University, Sari, Iran

*** Corresponding author email address**: shojaei.vahid@yahoo.com

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A B S T R A C T

Objective: In today's world, creating movement and dynamism in business is not solely achieved through capital and a skilled workforce. The entrepreneur is a new player who provides the necessary dynamism for economic activities in today's complex economy. The aim of this study was to identify the factors influencing the development of innovations and inventions in Iranian sports.

Methods and Materials: The present research was conducted using a mixed-method approach. The first part was exploratory and conducted through exploratory factor analysis. The second part was qualitative, focusing on the opinions of experts. The sample in the quantitative section included 178 individuals, comprising sports management professors, ideators, inventors, entrepreneurs, and entrepreneurship and sports business instructors. They were selected through non-random snowball sampling and purposive non-random sampling. The qualitative section included 16 experts in the field of sports business and entrepreneurship. Data collection tools in the quantitative section included a valid and reliable 66-item researcher-made questionnaire, and in the qualitative section, in-depth individual interviews were conducted.

Findings: The results indicated that six factors were identified by the sample members as influencing the development of sports innovations and inventions in Iran: managerial, intrinsic/infrastructural, procedural, economic, legal, and political. Together, these six factors explained approximately 74% of the variance in the development of sports innovations and inventions.

Conclusion: Overall, it can be stated that attention to the factors influencing the development of inventions and innovations can pave the way for the development of sports in the country and create entrepreneurial opportunities in Iran's sports industry.

Keywords: *Management of Innovations and Inventions, Entrepreneurship, Sports Industry*

1 Introduction

Entrepreneurship plays a very crucial role in advancing the development and prosperity of societies and is considered a fundamental factor in creating economic value in society (Omidi et al., 2016). Entrepreneurship is learned through experience and discovery, and entrepreneurial learning should be understood as a lifelong process that continuously shapes and revises itself as a new experience (Goudarzi, 2016). Strategic actions for the growth and development of entrepreneurship, particularly in the field of higher education, are crucial. Furthermore, entrepreneurship education can be one of the most effective methods for the seamless transition of graduates into the labor market (Golabchi et al., 2024; Rahimi et al., 2024; Segal et al., 2005).

Most studies indicate that entrepreneurship, or at least certain aspects of it, can be taught and learned; although many personal requirements are needed to create and develop entrepreneurship. Therefore, education can be considered a key means to improve entrepreneurial outcomes such as attitudes, intentions, and competencies (Barba-Sánchez & Atienza-Sahuquillo, 2018). Entrepreneurship education has today become one of the most important and widespread university activities, and this educational system will be effective and efficient if it can equip its human resources in training with the knowledge, skills, and characteristics of entrepreneurs and foster an entrepreneurial spirit in them (Baptista, Naia, Biscaia, Januário, & Trigo, 2017). Educational systems, by implementing entrepreneurship education, ensure that learners face various activities related to learning, and this type of education prepares them to achieve exploration skills (Jones et al., 2011).

In addition to the issues and concepts concerning society such as industry, entertainment, religion, and spiritual nurturing, health systems, etc., sports have been considered as one of the influential factors on social, economic, and even international domains in many countries around the world (Parsakia et al., 2022; Ratten, 2011). Thus, it can institutionalize and promote policies such as the management of innovations and inventions and entrepreneurship and job creation, provided that while promoting and identifying sports entrepreneurship in society, especially among physical education students and active human resources in sports at various levels, the obstacles and problems facing the education and development of sports entrepreneurship are eliminated, so that it can successfully act as a powerful tool for achieving economic and social development and sustainability (Ratten, 2011).

Every individual aiming to become a successful entrepreneur must acquire skills through education. Possessing entrepreneurial knowledge and skills enhances the attitudes of individuals involved in sports, such as coaches, athletes, analysts, researchers, etc., towards entrepreneurship and increases their motivation to participate in entrepreneurial activities (Nabi et al., 2010). Skill-based knowledge can complement theoretical knowledge, and currently, university graduates constitute a significant portion of the unemployed population in the country, where skill-based education can provide an important foundation for job creation and economic prosperity in society. This education not only undertakes the training of the workforce required by various economic sectors but also, through the groundwork for self-employment, significantly helps to resolve the problem of unemployment (Song et al., 2017).

The main root of the existing issues and disarray in sports lies in the lack of necessary skills and abilities to perform tasks and the neglect of training essential skills has resulted in the absence of entrepreneurial training in universities (Shepherd et al., 2020; Shepherd et al., 2014). Given that the current stagnation in the country is not necessarily related to seasonal and cyclical economic fluctuations and has a structural aspect, temporary measures and solutions, if implemented without considering structural reforms, will not only fail to resolve this problem but will exacerbate it in the future. Therefore, considering the importance of the aforementioned issues, the present research seeks to answer the question of what are the most important factors involved in creating and developing innovations and inventions in the field of sports?

2 Methods and Materials

2.1 Study Design and Participants

The present research was conducted using a mixed-method approach. The first part was exploratory and conducted through exploratory factor analysis; hence it is descriptive and correlational, carried out using a survey method with a systematic approach. The second part was qualitative and focused on the opinions of experts; that is, it was conducted with an attitudinal approach from experts. The statistical population in the first exploratory part included sports management professors, ideators, inventors,

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entrepreneurs, entrepreneurship instructors, and sports business professionals who were sufficiently familiar with the concepts of ideation, innovation (invention), entrepreneurship, and branding, and had adequate experience in sports business activities. From this population, 178 individuals were selected as the research sample. The sampling method in this phase was a combination of non-random snowball sampling and purposive non-random sampling. The statistical sample in the second part, which involved research modeling, included 16 experts in the field of sports business and entrepreneurship, half of whom had experience in innovation or invention and had experienced all stages of innovation and invention management from ideation to branding and commercialization. Among them, 8 were professors in the fields of sports management, entrepreneurship, and business management, and 8 were inventors and sports entrepreneurs. The sampling method in the qualitative section was non-random and purposive.

2.2 Data Collection

The data collection tool in the quantitative section was a valid and reliable 66-item researcher-made questionnaire that examined the factors influencing the management of sports innovations and inventions with an attitudinal approach. Such a questionnaire had not existed before and had not been used in research. The researcher, through the study of information sources such as books and numerous articles related to the topic, extracted various variables and developed the tool. The first section of the questionnaire included 3 demographic questions about the sample members' profession, education level, and their familiarity with the management of sports innovations and inventions. The preliminary questionnaire in the main section included 84 questions, of which 12 were removed during brainstorming sessions with experts and 6 were removed during exploratory analysis due to low factor loadings, leaving 66 questions.

2.3 Data Analysis

In the present study, to ensure the accuracy and reliability of the results, the technical characteristics of the questionnaire were evaluated in two sections: validity and reliability, using various criteria. Cronbach's alpha and composite reliability were used in the reliability section, and construct validity (in two parts: convergent and divergent validity) was assessed in the validity section. In the present study, to determine the validity of the questionnaires, face and content validity were initially used, for which the questionnaires were approved by the supervising professors and 7 experts in sports management and entrepreneurship, and necessary corrections were made. To measure reliability, Cronbach's alpha coefficient was used, and the research questionnaires were appropriate in this regard.

For the description and analysis of data in the quantitative section, Cronbach's alpha, exploratory factor analysis focusing on KMO indicators and Bartlett's test, and in the quantitative section, correlation estimation between variables were used, with all statistical analyses performed using SPSS and Smart PLS software.

3 Findings and Results

According to Table 1, the KMO value in the exploratory factor analysis was 0.724, indicating that the data condition for factor analysis is good and that sample adequacy is present. The Bartlett statistic was also significant. Table 4 presents the characteristics of the extracted factors along with their variables and factor loadings.

Table 1

Results of the KMO and Bartlett Test in Exploratory Factor Analysis

Index	Value
Sample Adequacy (KMO)	0.724
Bartlett's Test	
Chi-Square	4138
Degrees of Freedom	1706
Significance Level	0.001

The findings in Table 2 indicated that six factors were identified by the sample members as influencing the development of sports innovations and inventions in Iran: managerial, intrinsic/infrastructural, procedural, economic, legal, and political. Together, these six factors explained

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approximately 74% of the variance in the development of sports innovations and inventions.

Table 2

Summary of Exploratory Factor Analysis for Factors Influencing the Development of Sports Innovations and Inventions in Iran

Factor	Eigenvalue (Before Rotation)	Variance % (Before Rotation)	Cumulative % (Before Rotation)	Eigenvalue (After Rotation)	Variance % (After Rotation)	Cumulative % (After Rotation)
Managerial	19.283	17.127	18.127	19.119	17.029	17.029
Intrinsic	18.348	15.137	32.263	18.207	14.567	31.596
Procedural	16.003	13.930	46.194	15.298	13.327	44.923
Economic	13.824	12.607	58.801	13.206	12.004	56.927
Legal	12.483	10.073	68.874	12.287	9.738	66.665
Political	9.772	7.479	76.353	8.372	7.114	73.779

The detailed report of subscales related to each of the six main influencing factors is presented in Table 3. The factor loadings of each item under these factors are specified. The results of the exploratory factor analysis in this study identified six factors as influencing the development of sports innovations and inventions in Iran, with the subscales related to each factor and their factor loadings presented in Table 3. These findings indicated that in the managerial dimension, training specialists, designing strategic programs in the field of innovation and invention, optimal commercialization approaches, appropriate marketing and target market identification, proper needs assessment, avoiding the import of similar foreign products, forming work teams with diverse specialties, designing suitable places for discovery and ideation development, the existence of systemic structures, the invention classification system, appropriate licensing methods, appropriate administrative structures, the existence of venture capital funds, structural flexibility of workshops and research centers, confidentiality of innovation and invention information, innovation and invention foresight and future studies, benchmarking, appropriate university-industry relations, and branding products and services have the highest priorities, respectively.

In the intrinsic/infrastructural factors dimension, the variables with the highest priority are: high risk-taking, individual creativity, personal achievement motivation, team spirit, appropriate connections with international scientific references, the existence of reference books on sports entrepreneurship, equipping advanced specialized workshops, the existence of organizational promotion foundations, a culture of nurturing organizational elites, organizational authority, the existence of entrepreneurship centers and growth and technology parks, injecting a culture of innovation, social cohesion, social support, social branding, admiration for innovative human brands, and the existence of entrepreneurial family units.

The findings also indicated that in the procedural dimension, the highest priorities are: the identification of innovation and invention proprietors, the existence of a research and development model, avoiding organizational redundancy, the existence of an implementation platform for all ideas and plans, movement based on principles and standards, the existence of appropriate databases, modeling the research implementation process, suitability of initial disclosure of innovations and inventions, suitability of full disclosure of innovations and inventions, and creating an appropriate business model.

In the economic dimension, the most important variables identified are: currency stability, the absence of economic sanctions, the absence of sanctions on banks and financial institutions, adequacy of raw materials, the existence of sponsors and investors, designing profitability models for knowledge-based businesses, and not relying on a single-product economy.

In the legal dimension, the highest priorities are: researchers and inventors' familiarity with idea registration rights, familiarity with patent rights, familiarity with intellectual and spiritual property rights, protection of intellectual and spiritual assets, protection of the exclusive material rights of innovations and inventions, awareness of international patent rights, and familiarity with the process of idea and invention registration.

Finally, in the political dimension, the most important variables identified are: political freedom for researchers to conduct research activities, no restrictions on the activities of brokerage firms, banks, and financial institutions, no restrictions on international organizations' relations with research institutes, avoiding a focus on political and day-to-day issues instead of strategic issues, appropriate support for

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ideas and innovations by responsible bodies, avoiding inappropriate competition from the government with knowledge-based companies, adherence to strategic plans and avoiding politicization, and avoiding political approaches in designing and continuing development strategies.

Table 3

Subscales Related to Exploratory Factors Influencing the Development of Sports Innovations and Inventions with Factor Loadings

Item	Variable	Managerial	Intrinsic	Procedural	Economic	Legal	Political
1	Training specialists	0.91					
2	Designing strategic programs in the field of innovation/invention	0.88					
3	Optimal commercialization approaches	0.86					
4	Appropriate marketing and target market identification	0.84					
5	Proper needs assessment	0.83					
6	Avoiding the import of similar foreign products	0.83					
7	Forming work teams with diverse specialties	0.82					
8	Designing suitable places for discovery and ideation development	0.76					
9	Existence of systemic structures	0.74					
10	Invention classification system	0.73					
11	Appropriate licensing methods	0.71					
12	Appropriate administrative structures	0.70					
13	Existence of venture capital funds	0.70					
14	Structural flexibility of workshops and research centers	0.69					
15	Confidentiality of innovation and invention information	0.68					
16	Innovation and invention foresight and future studies	0.65					
17	Benchmarking	0.65					
18	Appropriate university-industry relations	0.63					
19	Branding products and services	0.62					
20	High risk-taking		0.88				
21	Individual creativity		0.86				
22	Personal achievement motivation		0.86				
23	Team spirit		0.84				
24	Appropriate connections with international scientific references		0.81				
25	Existence of reference books on sports entrepreneurship		0.76				
26	Equipping advanced specialized workshops		0.74				
27	Existence of organizational promotion foundations		0.74				
28	Culture of nurturing organizational elites		0.72				
29	Organizational authority		0.71				
30	Existence of entrepreneurship centers and growth and technology parks		0.69				
31	Injecting a culture of innovation		0.68				
32	Social cohesion		0.68				
33	Social support		0.65				
34	Social branding		0.64				
35	Admiration for innovative human brands		0.62				
36	Existence of entrepreneurial family units		0.61				
37	Identification of innovation and invention proprietors			0.92			
38	Existence of a research and development model			0.87			
39	Avoiding organizational redundancy			0.84			
40	Existence of an implementation platform for all ideas and plans			0.83			
41	Movement based on principles and standards			0.82			
42	Existence of appropriate databases			0.80			
43	Modeling the research implementation process			0.75			
44	Suitability of initial disclosure of innovations and inventions			0.73			
45	Suitability of full disclosure of innovations and inventions			0.71			
46	Creating an appropriate business model			0.68			
47	Currency stability				0.88		
48	Absence of economic sanctions				0.86		
49	Absence of sanctions on banks and financial institutions				0.86		
50	Adequacy of raw materials				0.85		

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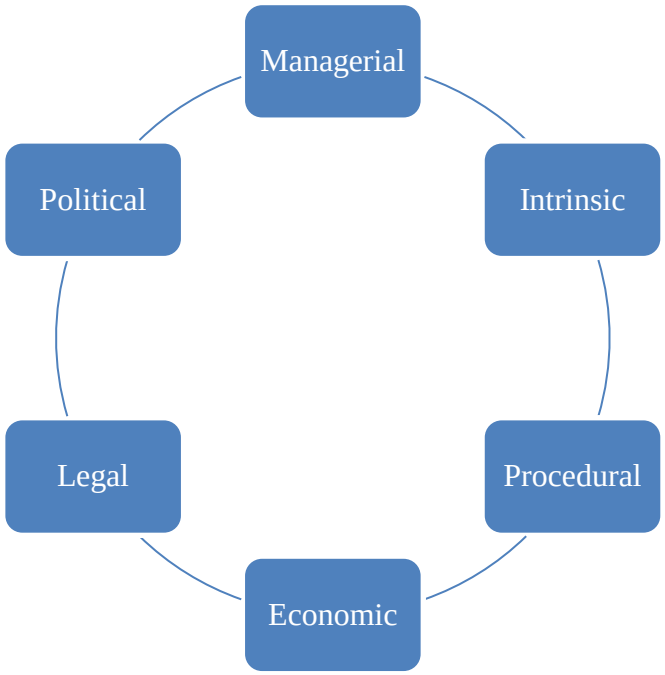
51	Existence of sponsors and investors	0.78	
52	Designing profitability models for knowledge-based businesses	0.74	
53	Not relying on a single-product economy	0.71	
54	Researchers and inventors' familiarity with idea registration rights	0.84	
55	Familiarity with patent rights	0.81	
56	Familiarity with intellectual and spiritual property rights	0.77	
57	Protection of intellectual and spiritual assets	0.73	
58	Protection of the exclusive material rights of innovations and inventions	0.67	
59	Awareness of international patent rights	0.64	
60	Familiarity with the process of idea and invention registration	0.63	
61	Political freedom for researchers to conduct research activities		0.82
62	No restrictions on the activities of brokerage firms, banks, and financial institutions		0.80
63	No restrictions on international organizations' relations with research institutes		0.74
64	Avoiding a focus on political and day-to-day issues instead of strategic issues		0.71
65	Appropriate support for ideas and innovations by responsible bodies		0.71
66	Avoiding inappropriate competition from the government with knowledge-based companies		0.70
67	Adherence to strategic plans and avoiding politicization		0.65
68	Avoiding political approaches in designing and continuing development strategies		0.63

Figure 1

Factors Influencing the Development of Sports Innovations and Inventions in Iran



4 Discussion and Conclusion

This research aimed to identify and explore the factors and variables influencing the development of sports innovations and inventions in Iran in the first phase, and in the second phase, to provide a qualitative model in this area. The findings of this research are consistent with prior studies (Barba-Sánchez & Atienza-Sahuquillo, 2018; Martín-Rojas et al., 2011). Entrepreneurship involves seeking opportunities and then searching for the necessary resources. Opportunities are not found, they are created, and they are not permanent. Entrepreneurial windows are not always open; they open when the wind starts blowing and then close. To identify entrepreneurial windows and discover

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opportunities, the entrepreneur connects with various individuals, participates in informal networks and voluntary activities, and obtains business-related information through informational networks in different sectors.

These studies emphasize that organizations capable of continuing to operate and not failing in today's changing world are those that are creative and innovative. This is possible when an organization values its creative and innovative individuals and supports their programs. Thus, for an organization to achieve higher productivity, it must engage in entrepreneurial behaviors, and creativity and innovation, as complementary components of entrepreneurship, play a significant role in employee productivity (Martín-Rojas et al., 2011; Parsakia et al., 2022).

An entrepreneurial culture can facilitate organizational performance, as it provides the foundation for creating innovation. Additionally, culture can increase speed and diversity in the context of innovation and creativity in various organizational processes (Nabi et al., 2010). Creating the groundwork for commercializing research findings and delivering knowledge to the market and society not only provides significant economic values for individuals and research organizations but also leads to technical and economic growth and increased societal welfare. The importance of this issue has led to numerous studies and research on commercialization and marketing in various institutions. In research organizations, commercialization is essential because without achieving specific customers for a product, production or conducting experiments on an idea would be futile. Despite the acceptance of commercialization by researchers and the registration of numerous patents, efforts to commercialize these inventions and innovations often fail (Shepherd et al., 2020; Shepherd et al., 2014).

Today, predicting the success of innovative commercial actions and assessing the potential for their commercialization are major concerns for inventors and officials. On the other hand, the complexities of the commercialization process make it difficult to predict its success. Commercializing research is a process that utilizes all possible opportunities to obtain the benefits created by their innovations (Song et al., 2017). Technological commercialization is a complex process influenced by numerous infrastructural, technological, business, social, political, historical, and other factors. Each of these factors can either contribute to or hinder the success of commercialization. Overall, the factors for growth and successful commercialization can be categorized into three layers: insights, policies, and infrastructures. In many cases, public insights narrow the path of technological commercialization, creating numerous obstacles and challenges to wealth creation. Experience has shown that changes in science and technology policies in various countries have led to sudden leaps in their technological development. Appropriate policy-making can also facilitate the faster change of insights (Martín-Rojas et al., 2011).

Authors' Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were observed.

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