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Barriers to Winning Medals at International Swimming Events: An Understanding of the Iranian Experts' Heuristic Patterns

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Article Info

Abstract

Article type: Research Article

Received:

14 Feb 2023

Accepted:

03 Mar 2023

Published online:

30 June 2023

The purpose of this study was to investigate barriers to winning medals at international swimming events and an understanding of Iranian experts' heuristic patterns. In this study, Q methodology was used as one of the mixed methods. The target population of the study was 20 people who consisted of national team swimmers, elderly swimmers, swimming coaches, the swimming federation board, and active provincial swimming officials. By creating a space of discourse, 50 short phrases were chosen as the Q phrase. After evaluating and summarizing the discourse space, using the experts' opinions, 37 phrases were selected as the final Q phrase. These expressions were provided to the research experts in the form of the "Q Ranking Questionnaire." Data were analyzed using Q factor analysis. Inadequate funding in swimming, lack of proper planning for talent identification and weakness in attracting sponsors were examples of Q expressions. In addition, the results of the Q factor analysis showed six heuristic patterns : attitude-oriented; infrastructure; financial; technical and executive; managerial; and, education and scientific-based. Close attention is suggested to the factors identified as barriers to the success of swimmers in international competitions.

Keywords:

Heuristic patterns, Q Methodology, Sport Events, Swimming

Cite this article:

Bahrevar, A., Benesbordi, A., & Shooshinasab, P. (2023). Barriers to Winning Medals at International Swimming Events: an Understanding of the Iranian Expert's Heuristic Patterns. *Archives in Sport Management and Leadership*, 1(1), 30-44. [doi: 10.22108/jhs.2023.136845.1007](https://doi.org/10.22108/jhs.2023.136845.1007)

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Published by University of Isfahan



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Introduction

Sport and the importance of international competitions have drawn tremendous attention from governments. Global and continent contests and, above all, the Olympic Games are the occasion to take part in the ritual of the Olympic movement while celebrating nationality, collective identity, and uniqueness on the global stage. These events are also significant environments for young athletes to compete in and to present their abilities and talents in different sports. Countries' achievements in international competitions have positive social and economic impacts. These achievements are a sign of stability and capability, which are considered as the essential reasons for high investment in sport championships (Wicker & Frick, 2020).

Today, success in international sports competitions has various values, including a sense of national pride, the potential for economic profitability, and diplomacy in general (Arnold et al., 2015; Seifpanahi Shabani, & Haji Hasani, 2018). For most governments, sporting success is often a valuable resource because it has the potential to help achieve a wide range of non-sporting achievements (De Bosscher et al., 2009).

Oakley and Green (2001) stress that achievements in international sport competitions will bring both financial benefits and dignity to nations. Thus, there is a great deal of effort expended in training elite athletes and constructing strategies to be successful in sport performance at global events. Olympic medals resonate with a nation's healthy economy, proper funding support and a great sport system efficient in managing training methods and recognizing talent (Oakley & Green, 2001). In addition, attending sporting events can be effective in promoting communities' health (Alexandris et al., 2019; Bullough et al., 2015).

Countries have found that developing championship sports and achieving their direct and indirect benefits is not possible without planning, adopting the right policies, and paying attention to the factors that affect these sports (Seifpanahi Shabani & Haji Hasani, 2018). Therefore, championship sports programs and policies have received increasing research attention (Brouwers et al., 2015). Recent scholarship has suggested that national elite sport policies follow strategic rationales when dedicating scarce resources to participation in international sport (Meier et al., 2023).

In this regards Truyens et al. (2014) identified the following general factors as a competitive advantage for countries in championship sports: financial support, policies of sports organizations, youth participation in sports, talent identification and talent development, support for athletes, training and competition facilities, coaching and education, participation opportunities in national and international competitions, scientific support, and environmental factors. De Bosscher et al. (2009) analyzed and interpreted training programs and developing policies for elite sports in six different countries. They found that financial resources, supporting elite athletes, providing facilities and equipment, in addition to improving coaching sciences were critical factors for success and developing champions.

The nature of sports is unique. To examine the factors that impact athletes' success in international sporting events, we need to focus our analysis on one sport at a time. Among the various sports, Swimming is a popular Olympic sport that has a variety of distances in freestyle, backstroke, butterfly, and breaststroke (frog). In addition to individual competitions, there are competitions in the form of the medley relay (4-person) or freestyle (Elango et al., 2019). This sport has the most extensive distribution of medals (108 medals) in the Olympics after track and field (Majumder & Choudhury, 2014). Swimming has always been noted for its benefits and for producing many medals at the Olympic Games (Green & Holihan, 2005). Thus, regarding the championship potential of swimming, both short-term and long-term planning for this sport as a major sport is the focus of many sports organizations in the world. As an example, is China with a huge investment in swimming as it is a potentially medal-driven sport. It is therefore, one of the defining sports for any country. Its rise in prominence is associated with benefits such as an increased sense of national pride and international prestige (Sotiriadou & Shilbury, 2009) as well as economic and diplomatic benefits (Green & Holihan, 2005).

Elango et al. (2019) examined the critical factors in the success of Thai national swimmers to win medals at the Olympics. They analyzed the United States, Germany, Australia, Japan, Finland, and the United Kingdom as they represent the top countries in Olympic swimming competitions. Financial support, expert coaches, and sports knowledge were identified as crucial factors. Majumder and Choudhury (2014) found that cultural, social, financial, and technical factors, including swimming techniques, mental strength, nutrition, fighting spirit, excellent coaches and long-term exercise planning are key to success in swimming competitions among different races.

Swimming is a popular sport in Iran. Geographical location of Iran, which is connected to the Caspian Sea in the north and Persian Gulf and Oman Gulf in the south, hot climate conditions with long summers as well as religious instructions to focus on swimming, has been crucial in this popularity. The Iranian Swimming

Federation was established about 75 years ago. Initially, there was only one standard swimming pool in Iran at that time, but over time, the number and the quality of swimming pools increased. Today, swimming in Iran has expanded both in the public and in the professional and championship aspects, however, it has not made much progress compared to other fields of sports. Iran has participated in the Olympic Games for 17 times but swimmers appeared in just 7 seasons, 6 of which have been with the Wild Card of the World Swimming Federation. Just in 2008 one Iranian swimmer could win an Olympic quota, however no Iranian swimmers have won medals in these competitions so far. The same is true for other events such as world championships and the Asian Games. This deficiency could be one of the obvious reasons for the severe challenges this sport is facing in Iran. According to Stamm and Lamprecht's index (2001) the number of medals awarded to each country in the Olympics Games is based on major indices such as population size and the duration of membership in the International Olympic Committee. Given Iran's population of over 80 million and the long history of the formation of the Iranian Swimming Federation, the question must be asked is that what are the reasons for Iran's failure to win medals and higher rankings for its athletes in international competitions in swimming? Examining the Iranian swimmers' barriers to winning medals at international swimming events is crucial for Iranian managers and coaches. Still, it can also help managers and coaches of other countries get an overview of the swimmers' barriers to winning medals and success in international events.

In this regard, Gaeini et al. (2006) argued that some of the problems and challenges in Iran's swimming competitiveness originate in the lack of appropriate qualitative talent identification. Undoubtedly, success in international sports competitions is not possible without a proper talent identification plan. National and international organizations, clubs and coaches are very interested in developing the talent identification system and invest a lot of financial and human resources for it (Barreiros & Fonseca, 2012). Ghahremantabrizi et al. (2017) in a study identified and prioritized obstacles of the swimming development and progress in Iran. They found not paying attention to swimming at schools, a scarcity of managerial planning skills, a lack of media support, not having enough sponsors, and the shortage of appropriate pools for practice and competition as the most important barriers for swimming development. Firoozi et al. (2012) also conducted a study of the obstacles and challenges to swimming development in Iran. Their results showed that a lack of long-term planning and a lack of media support were the most critical barriers for developing swimming in Iran. The importance of strategic and long-term and the media coverage are two critical factors for championship sports which has been emphasized by many another research. With appropriate sport media coverage, sponsors will be more willing to invest and the public will be more aware, curious and interested in sports (Razavi et al., 2013).

The use of the necessary equipment in swimming is an integral part of the championship system. Singh and Hu (2008) believe that the role of equipment and facilities, along with management and planning, are the essentials of any championship sport development system. They also note that their absence contributes to athletes' frustration in competition, which ultimately affects the swimmer as a resource (Singh and Hu, 2008). Research by Annual Report of Australian Swimming Incorporated (1988) indicated that setting swimming facilities mostly in private schools, the lack of communication between the private and public sectors and having island policies, single star training, the unequal distribution of facilities and pools, the high costs of experienced and qualified trainers and not paying attention to strategic planning are the most important problems that face Australian swimmers (ASI, 1988). A shortage of swimming pools and facilities may be another reason for Iran's failure to successfully compete in international competitions (Ghahremantabrizi et al., 2017).

Some research has been done on the factors affecting championship sports success in other kinds of sports. for example, Seifpanahi Shabani and Haji Hasani (2018) found that success factors of Iranian teams in international competitions included: talent identification, primary and basic age sport teams, financial resources, coaches, facilities, preparing games, management stability in sports organizations, strategic planning, training camps, leagues and competitions, clubs, national team psychologists, players' mental health and scientific workshops, respectively. Brouwers et al. (2015) identified the success factors in international tennis events as financial support, structures and policies, talent identification and development, supporting athletes, training facilities, coaching development, national competitions, and scientific research. They also identified cultural factors, including tennis culture, general sports culture, school culture, the atmosphere surrounding championship sports, private sector involvement, and the media as factors influencing the success of tennis events. Valenti et al. (2020) looked at the role of championship sports policies in the success of sports and the performance of European women's national football teams. The results showed that providing highly qualified coaches had a positive and significant effect on the international success of women's soccer teams. Still, the impacts of financial support, human resources, and

preparation activities were not substantial. Also, the economic development of the country, the talents, and men's football heritage were significant predictors for the level of the performance of women's football.

A review of the research background shows that various factors influence athletes' success in international sporting events and there are various barriers to their success. As mentioned earlier, different sports have their unique nature and conditions, and to properly analyze the barriers to winning medals at international swimming events. Research should be done directly on the barriers of success in this sport. Also, we need to categorize various factors for a better organization and work division, so swimming managers and coaches can address the factors within their work scope. It is also important to note that all factors cannot be promoted simultaneously due to the limited resources available, and issues that have a higher priority must be addressed. It is crucial to focus on research that identifies, categorizes, and prioritizes swimmers' success barriers in international events. The results of the current research will be valid for both swimming managers and swimming coaches. Research shows that coaches are one of the essential factors in sports success and their work has a significant impact on the results (De Bosscher et al., 2009; Truyens et al., 2014; Majumder and Choudhury, 2014; Seifpanahi Shabani and Haji Hasani, 2018; Elango et al., 2019; Dohlstien et al., 2020). Current research findings help coaches to plan and guide athletes more efficiently.

Finally, in the field of swimming development, research is limited, and more specifically no research has addressed championship swimming in Iran. More importantly despite heavy investment, the reasons for the lack of Iranian swimmers' success in international events are not clarified. The method we used in current research to identify, categorize and analyze factors which are crucial in Iranian swimmers' failures in international events, can be useful for the Iranian Swimming Federation, specifically. However, it is a precise method which can be adopted by other federations and sport organizations which has not gained optimal achievements in international scenes. So, the main object of the current research was to investigate barriers to winning medals at international swimming events: an understanding of the Iranian experts' heuristic patterns about success' factors.

Research Methods

Regarding its purpose, the present study is heuristic done by a mixed method (qualitative and quantitative). The discourse space plays a qualitative role in the review section and a quantitative role in Q factor analysis. Thus, using the Q methodology, heuristic patterns of the swimming experts regarding the barriers to winning medals at international swimming events were identified.

Using Q method, the researcher would obtain the required information by identifying the subjective viewpoint of experts and elite athletes in the field. The Q methodology is a technique that first enables the researcher to identify and categorize individual perceptions and beliefs, and then to categorize groups according to their perceptions (Amin, 2000). Its difference to other methods that are used in the social science is analyzing people instead of variables, and thus achieving a kind of typology (Lee, 2017). Furthermore, regarding the data collection procedure (i.e., sorting people), more in-depth findings can be gained about the participants' viewpoints (Brown, 1996; Watts & Stenner, 2005).

The statistical sample of the present study consisted of national team swimmers, elderly swimmers, swimming coaches, swimming federation board, and active provincial swimming board officers. The sampling method was purposeful, and the researchers tried to identify the people who had the most appropriate information in the field of research. The Q methodology suggests that the number of participants should be between 20 to 80 participants depending on the number of Q expressions. Brouwer (1999) argues that the number of participants should be less than the number of Q expressions that need to be sorted. In the current study, discourse space was obtained by interviewing 20 people regarding their viewpoints, Q samples and alternatives and the Q collection were then obtained, respectively. The primary function of Q methodology is an understanding of the mind, viewpoints, beliefs, and attitudes of individuals. It encompasses a variety of concepts such as aesthetics, individual preferences, personal and family experiences, and approaches to different groups (Amin, 2000). The Q method is explicitly designed to study the complexity of the participants' perceptions and their views that are then organized by appropriate categorization. The Q study process involves five key steps (Tielen et al., 2008): Providing discourse space, selecting participants, Q chart evaluation and interview extraction, analyzing data, Interpreting data. In the current study, in-depth interviews were used as the primary data collection tool. Conducting systematic research using a mixed method such as the Q methodology helps researchers who want to investigate mindsets, views, feelings, and personal beliefs. Participants were required to rank and sort a defined set of Q

statements or collections that were identified from the discourse space regarding the barriers to winning medals at international swimming events. Then further analysis and interpretation was done by the researchers. Q factor analysis was used as Statistical method in quantitative phases of research. Statistically, there is no difference between Q factor analysis and normal factor analysis. The principal components method was used in Q factor analysis. To perform factor analysis, each factor was rotated by varimax method.

Findings

Preparing Q Cards

In the first step, the discourse space and the Q collection was prepared. The discourse space was based on a comprehensive set of literature, including the study of scholarly articles and scientific papers, newspapers, magazines, and other media sources. Furthermore, it supported by qualitative methods, interviews, and group discussions all addressed the barriers to winning medals at international swimming events. The main goal at this stage was to provide the content that constitutes the discourse space in order to obtain the personal thoughts, feelings, beliefs, and attitudes of the participants and their perception of concepts and variables - not necessarily the facts. Therefore, the expressions or statements collected are fundamental assumptions of the individuals and their tendencies and experiences on the subject. Creativity and exchanging ideas were considered as well. In this method, the derived sample information is called "Q samples," collectively as "Q sets." The Q samples are either a proposition or a phrase about different aspects of the subject under study. At this stage, the appropriate alternatives of experts' heuristics patterns regarding the barriers to winning medals at international swimming events were selected, and each option was placed on a Q card. This stage was conducted through interviewing 20 experts in swimming and the results were analyzed using live coding.

Q Phrases

The second step was a Q valuation that was done as participants were identified; they ranked the Q sample in its table. At this stage, the necessary modifications were made to the phrases, originating from 20 experts' suggestions. This reduced the number of phrases from 50 to 37. The results were shown in table 1.

Table 1- Barriers to winning medals at international swimming events

Code	Factors
1	Inadequate funding in swimming
2	Lack of proper planning for talent identification
3	Shortage of standard pools and up-to-date equipment
4	Lack of continuous training camps
5	Insufficient attention to the development of women's swimming
6	Low national media presence
7	Weaknesses in training coaches
8	Lack of in-service training of trainers and coaches
9	Lack of attention to talent-scout coaches
10	Lack of coordination in regular and continuous national and provincial competitions
11	Not paying attention to basic age categories
12	Lack of conferences and seminars specifically in swimming field
13	Weakness in the primary and modern training of swimming referees
14	Weak cooperation of swimming federation and the Ministry of Education for talent identification at schools
15	Weakness in attracting sponsors
16	Having no seats in international swimming organizations
17	Weakness in strategic planning
18	Not paying enough attention to swim sport by private and public clubs
19	Not possessing pools exclusively for provincial swimming boards
20	Weaknesses in the scientific development of swimming sport
21	Inappropriate management structures of provincial swimming boards
22	Not holding school competitions
23	Inadequate attention of the government to the champions' living needs
24	Not profiting of young and specialized human resource
25	Not enough research in the field of championship swimming
26	Shortage of specialized swimming academies
27	Insufficient attention to empowering federation members
28	Inadequate support of the swimming federation by the Ministry of Sports and Youth
29	Insufficient attendance at international tournaments
30	Weakness in swimming federations macro-policies
31	Short management period at federation's high management levels
32	Coaches' inadequate knowledge
33	Cultural, historical, and geographical challenges
34	Not holding regular league
35	Not paying attention to swimming at schools
36	Not employing distinguished and first-class coaches
37	Low number of swimmers

Q Charts Completion

The third step was to complete the Q charts and extract the interviews' information. At this stage, the final cards were presented to the experts for evaluation using the comments of the participants. The experts made necessary modifications and corrections to the phrases and rated and sorted the cards on the charts based on the forced distribution. Figure 1 show an example of Q cards.

The lowest impact					No impact					The highest impact
-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
21	27	20	14	9	8	25	28	1	18	35
	29	34	10	24	4	12	6	37	15	
		30	32	31	13	11	2	23		
			7	26	36	3	17			
				33	19	16				
					22					
					5					

Figure 1. An example of Q cards

Q Factor Analysis

Data from participants’ sorting were entered into SPSS® software version 16 to identify the participants’ different heuristic patterns. Factor analysis is the primary statistical method for analyzing a Q data matrix. The basis of this method is the existing correlation between individuals; hence, the “Q factor analysis” is used to emphasize that in the process of factor analysis, individuals are categorized instead of variables. The extraction method was the principal components analysis. Varimax rotation- a type of orthogonal- rotation, is used to perform factor analysis. Table 2 shows the total amount of explained variance. A total of six factors (with eigenvalues above 1) were identified, these six factors stand for about 69.993% of the variance.

Table 2- The total amount of variance explained

	Total Variance Explained								
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.75	33.766	33.766	6.75	33.766	33.766	2.77	13.870	13.870
2	1.89	9.483	43.249	1.89	9.483	43.249	2.46	12.301	26.171
3	1.65	8.295	51.544	1.65	8.295	51.544	2.38	11.945	38.116
4	1.46	7.300	58.845	1.46	7.300	58.845	2.29	11.480	49.596
5	1.20	6.016	64.861	1.20	6.016	64.861	2.24	11.203	60.798
6	1.02	5.132	69.993	1.02	5.132	69.993	1.83	9.194	69.993
7	.899	4.497	74.490						
8	.814	4.070	78.560						
9	.672	3.361	81.921						
10	.650	3.249	85.170						
11	.604	3.018	88.188						
12	.498	2.488	90.676						
13	.427	2.133	92.809						
14	.355	1.773	94.581						
15	.336	1.678	96.259						
16	.279	1.393	97.652						
17	.186	.930	98.582						
18	.124	.620	99.201						
19	.106	.531	99.732						
20	.054	.268	100.000						

In Table 3, the rotated component matrix is shown. According to this matrix, the individuals in each of the six heuristic patterns are identified.

Table 3- Rotated Component Matrix

1	2	3	4	5	6
.803	.309	.150	.134	.107	-.134
.735	.089	.128	-.101	.258	.290
.683	-.027	.265	.310	.144	-.039
.638	.041	.125	.512	.036	.144
.115	.801	.284	.020	.116	.032
.157	.780	.002	.263	.265	.048
.279	.576	.131	.474	.254	.296
.123	.493	.387	.424	.283	.245
.128	.131	.835	-.050	.048	-.081
.211	.105	.654	.206	.082	.089
.389	.408	.486	.241	.082	.174
.200	.169	-.117	.705	.086	-.137
-.095	.366	.283	.594	.291	.143
.210	-.025	.329	.538	-.109	.260
.184	.240	-.046	.030	.820	.017
.098	.243	.058	.364	.626	.326
.261	.048	.449	.125	.585	-.105
-.042	.038	-.122	.145	-.034	.807
.393	.207	.221	-.016	.321	.575
.103	-.093	.426	-.152	.531	.560

At this stage, the significance of the factor loads should be examined, as in Table 3 were bolded. If the absolute value of factor load is higher than $1.96 / (\sqrt{n})$, then the factor load will be significant with 95% confidence. In this formula, the value of n is equal to the number of individuals or the Q cards study.

As expressed before, in the current study, the number of Q cards was 37, so the answer to $1.96 / (\sqrt{37})$ will be equal to 0.32. Given the bolded figures in the table 3, the identified factor loads for all the participants exceeded 0.32. So, for all individuals they are significant with 95% confidence. Participants 3, 1, 15, and 2 all selected the first heuristic pattern. Participants 16, 19, 7, and 18 shared the second pattern, while participants 5, 10, and 9 selected the third heuristic pattern. Participants 8, 17, and 4 selected the fourth pattern, and participants 12, 20, and 11 picked the fifth pattern, followed by participants 13, 14, and 6 who selected the sixth heuristic pattern, respectively.

Factors' Interpretation

After completing the factor analysis, the elements were interpreted, to determine their meaning and definition Factor score was used for this target. The phrases' factor score binds the content of the phrases to the factors allowing for the factors' interpretation.

To evaluate the initial data of factor scores, the Q table, as well as factors' load table, were used. First, significant factors weight was calculated using the formula $w = f / (1-f^2)$. In this formula, f stands for the factor, and w stands for the corresponding weight. Then, each weight is multiplied by the initial rank obtained from the Q card (according to the spectrum understudy) for every participant to obtain the factor scores. Table 4 shows the factor scores and the rank of each phrase.

Table 4- Phrases' ranks in each heuristic pattern

	Factor score						Phrases' ranks in each pattern					
	FAC1_1	FAC2_1	FAC3_1	FAC4_1	FAC5_1	FAC6_1	F1	F2	F3	F4	F5	F6
1	1.5949	.25216	2.2275	1.0858	1.4342	.28999	4	13	1	5	4	18
2	.61740	.55513	.18760	1.5696	1.2092	.89334	9	9	17	4	5	8
3	.08187	2.2141	1.2722	-.76349	1.4593	.54245	14	2	5	31	3	10
4	.01275	.05599	1.3224	.48879	1.1424	-.08356	17	17	4	11	6	21
5	-.30471	-.13353	-.14086	.28740	1.0419	-1.0893	22	20	21	13	8	32
6	.63335	.97389	.91003	-2.0112	1.5048	-.63486	8	6	7	37	2	29
7	-.83514	-.90114	-.94637	-.79337	1.8839	.88171	31	32	31	32	1	9
8	.03088	.56122	-.95801	-.42272	.46497	.25979	16	8	32	22	12	19
9	-.32887	-.87757	-.17714	.05198	.91433	.33458	23	31	22	16	9	15
10	-.75866	-.79458	-.63290	-.58951	1.0568	1.4413	29	29	30	26	7	1
11	.30751	.15029	-1.5661	2.2691	.85390	.51849	13	14	34	2	10	12
12	.31186	-.99413	-.37375	-1.1661	-.20311	-1.1078	12	33	26	35	22	34
13	-.07611	-.35303	-1.3169	-1.0531	.25967	1.1201	18	23	33	33	15	7
14	-.66085	-.38957	-.35663	.56228	.03616	.53777	28	24	25	9	17	11
15	1.6393	-.52404	1.4005	-.22002	-1.4992	1.2131	3	26	3	20	34	5
16	.07196	.25562	.35578	-1.3612	-.70483	-1.0942	15	12	15	36	29	33
17	.58552	-.22845	-.01709	-.04317	.21694	1.1583	10	22	19	17	16	6
18	1.9127	-.01426	.40561	-.49266	-.19969	-.30524	2	19	13	23	21	24
19	-.26909	1.0326	-.40662	.71598	.33831	-2.0671	20	5	27	7	13	36
20	-.98164	-.57717	.39454	-.73357	.02123	1.3696	32	28	14	29	18	2
21	-1.7378	.42143	-.05121	-.69903	-.02399	-.08189	37	11	20	28	20	20
22	-.28695	-.54103	-.30388	-.08835	.83233	-2.9182	21	27	24	18	11	37
23	1.4173	2.2668	.01343	.26334	-.25139	.40634	6	1	18	14	23	13
24	-.39873	-.47841	.40601	-1.0544	-.46514	-1.2981	24	25	12	34	25	35
25	.34333	-2.1275	.64371	-.11095	-.53406	.38989	11	37	9	19	26	14
26	-.53530	.04666	.41096	.89628	-.62821	-.56755	26	18	10	6	27	28
27	-1.5826	-1.2238	1.1964	.16961	-.86481	.31966	35	35	6	15	30	16
28	1.3776	-.85609	.80701	-.55189	-1.7349	.29731	7	30	8	25	35	17
29	-1.7026	.73129	1.5939	2.4832	-1.7562	-.39386	36	7	2	1	36	26
30	-1.1149	.11480	-.49587	-.75584	-.27637	-.23989	34	15	29	30	24	23
31	-.42069	-1.0243	.29347	.58238	-0.00016	-.41841	25	34	16	8	19	27
32	-.78258	1.9830	-1.7823	.52041	-.90025	1.3448	30	3	35	10	31	3
33	-.60268	-.18388	-.24081	-.23456	-1.2300	1.3314	27	21	23	21	32	4
34	-.99013	1.6727	-.46586	-.52705	-1.2540	-.82699	33	4	28	24	33	30
35	2.0841	.54678	-2.1176	-.69888	-1.7776	-.30737	1	10	37	27	37	25
36	-.10820	.08597	.40912	.44347	-.68174	-.17457	19	16	11	12	28	22
37	1.4559	-1.6982	-1.9004	1.9815	.31533	-1.0411	5	36	36	3	14	31

After acquiring factor scores, the six heuristic patterns were identified. These six heuristic patterns are as follows:

Attitude-oriented Pattern

The attitude-oriented Pattern with an eigenvalue of 2.774 represents approximately 14% of the participants' views. The viewpoints of four participants had a strong correlation (greater than 0.5) with the Attitude-oriented Pattern. According to this group swimming should be emphasized at schools, and that public and private clubs should pay enough attention to swimming (phrase 35, factor score 1 and phrase 18, factor score 2). Also, the members of this group believe that swimming committees have strong management structures and that enough attention is given to empowering members of the swimming federation (phrase 21, factor score 37 and phrase 27, factor score 35). Given the characteristics of this group, the success of swimmers in international events should be a priority for swimmers to focus on and there should be a focus on swimming in schools as well as in public and private clubs. This pattern is called attitude-oriented because it emphasizes changing attitudes regarding swimming, focusing on swimming from an early age in schools.

Infrastructure-oriented Pattern

The eigenvalue of this model was 2,460 and represented about 12.5% of the participants' views. Four participants' viewpoints strongly correlated with this pattern (greater than 0.5). Those who were included in infrastructure-oriented pattern believed that an essential factor for swimmers' success at international events

is to support and fund the champion and swimmers' livelihoods (phrase 23, factor 1). This group believes that the following factors cannot affect swimmers' lack of success: weaknesses in training coaches, lack of conferences and seminars specifically in the area of swimming and not enough research in the field of championship swimming (phrase 7, factor score 32/ phrase 12, factor score 33/ phrase 25, factor score 37). Members of this group consider the existence of standard pools and up-to-date equipment and full access to pools by swimming committees as important factors. On the other hand, this group believes that the knowledge of coaches and holding regular and purposeful leagues are essential for being successful in international events. This group focuses on supporting champions' livelihood financially. They believe that just training, education, or research are not desirable effective factors for success achievements in international events.

Financial-oriented Pattern

The eigenvalue of this model was 2.389, which represents about 12% of the participants' views. The viewpoints of three participants had a strong correlation (greater than 0.5) with this factor. People who fall into this group believe that there are enough swimmers in the country; furthermore, there is appropriate attention to swimming development at schools and coaches' knowledge, as well. On the other side this group strongly believe that budgeting and financial credits in swimming are among the most critical factors for success at international events, and these benefits can be provided by attracting strong sponsors. These sponsors can enable swimmers to have enough of a presence in international competitions, thereby contributing to success in international events (phrase 1, factor score 1 and phrase 15, factor score 3 and phrase 29, factor score 2). So, this pattern can be called financial-oriented because of the stress the group put on financial matters to succeed in international events.

Technical and Executive Pattern

The eigenvalue of this pattern was 2.296, which stands for about 11.5% of the participants' views—Three participants' views strongly correlated with this pattern (greater than 0.5). The success factors in this group include the presence of swimmers in cross-country competitions, which they believe contributes to the success of swimmers in international events (phrase 29, factor score 1). The group also argues that the basic and primary age category of swimmers is neglected and that the number of athletes who are active in swimming is insufficient (phrase 11, factor score 2, and phrase 37, factor score 3). They point out specialized swimming pools and swimming academies are not enough, and there is poor cooperation between the swimming federation and school boards in finding talented students. Besides, there are not enough training camps for national team swimmers, and first-class coaches are not available. Furthermore, they believe that there is insufficient attention to the development of swimming among women. Due to the characteristics of this group, special attention should be paid to the success of swimmers in international events and training camps, and these programs and camps need to be carefully planned.

Managerial-oriented Pattern

The eigenvalue of this pattern was 2.241 and represented about 11% of the participants' views—the views of three participants were strongly correlated with this pattern (greater than 0.5). This group believes that success in international events depends on well-established planning, a precise system of talent identification, regular training camps, and holding national and provincial competitions continuously (phrase 2, factor score 4 and phrase 4, factor score 6, and phrase 10, factor score 7). This group also believes that coaches' up-to-date training, media coverage, and the lack of standard pools and modern swimming equipment affects swimmers' success in international events (phrase 7, factor score 1 and phrase 6, factor score 2 and phrase 3, factor score 3). In their view, the attention given to swimming at schools and the support of the Ministry of Sport and Youth does not have a significant impact on the success of swimmers in international events. This pattern is called managerial since the group emphasizes a combination of well-detailed and systematic planning as well as continuous and organized coordination.

Education and Science-based Pattern

The eigenvalue of this pattern was 1.839, which represents about 9% of the participants' views. Three participants' viewpoints strongly correlated with this pattern (greater than 0.5). Members of this group believe that for swimmers to succeed in international events, sport swimming must be scientifically developed, knowledge of coaches should be upgraded, and referees should be trained in a principled and modern way (phrase 20, factor score 2, phrase 32, factor score 3). The group also believes that the lack of competition in schools and not owning any pool by the provincial swimming boards and not benefiting from

young and expert staffs are not significant for swimmers' success in international events. Given the characteristics of this group, the priority for the success of national swimmers in international events is to promote the scientific development of the swimmers, coaches, and referees. This pattern is called education and science-based.

Discussion

The purpose of the current study was to investigate barriers to winning medals at international swimming events: an understanding of the Iranian experts' heuristic patterns about success' factors. In total 37 factors were identified and six heuristic patterns were derived from these factors, using Q factor analysis; they were defined by calculating factor scores. By interpreting each of the factors and examining the characteristics of each group, it became clear that, for the first heuristic pattern (Attitude-oriented pattern), emphasizing swimming at schools and public and private clubs were the most important priorities. Ghahremantabrizi et al. (2017), in this regard, mentioned the importance of swimming sport at schools, which is in line with the results of the present study. They also considered sports clubs to be effective in the success of Iran's swimming national team in international events. Gaeini et al. (2006) also found that a lack of talent identification in swimming was one of the obstacles to the development of this sport, given that schools are one of the best places to identify talented children. They conclude attention to swimming in schools is of high importance.

The results of research by Truyens et al. (2014); and Valenti et al. (2020) also pointed out to the issue of talent identification. Truyens et al. (2014) see talent identification as one of the country's competitive advantages in championship sports, and Valenti et al. (2020) saw talent as an effective factor in the success of women's national football teams. To be successful in international swimming events, the directors of the Ministry of Sport and youth, the Ministry of Education, and the directors and planners of swimming must prioritize swimming in public and private schools and clubs, and develop their own plans and perspectives to achieve the desired and maximum result.

The second heuristic pattern was the development of swimming infrastructure and the importance of the living costs of Iranian heroes and swimming champions. There are currently two international standard pools in Tehran that are not owned by the Iranian Swimming Federation. The Swimming Federation must rent these two pools to plan national swimming team's training. This has prevented national team swimmers from using the pools full time, while daily training is a necessity in planning to participate and succeed in international competitions. The shortage of standard pools is higher in the other cities, and the provincial swimming boards often do not own any pools and must rent the existing pools. Furthermore, the pools are in poor conditions in terms of facilities such as the start platform. Ali, the head coach of the Iranian national swimming team acknowledged: "the currently starting board used in international competitions does not exist in Iran. This affects the performance of Iranian swimmers in international competitions". Reza, one of the swimmers of the Iranian national swimming team clarified: "There is no standard swimming pool in the city where I live, and my training pool does not have a starter board". For swimmers' success in future international events, managers and presidents of the federation should first and foremost build sport complexes and swimming pools throughout the country to provide a public presence for the entire nation. Ghahremantabrizi et al. (2017); the Annual Report of Australian Swimming Incorporated (1988); and Singh and Hu (2008) all pointed to the provision of the necessary infrastructure for swimming success, which is consistent with the results of the present study. Wilson and Millar (2022), Seifpanahi Shabani and Haji Hassani (2018); and Truyens et al. (2014) also mentioned sports facilities as an important factor to success in international competitions. In Financial-oriented heuristic Pattern, supporting champions with their living financial needs must also be addressed by the managers of the Swimming Federation and the Ministry of Sport and Youth, which provides the basis for the swimmers' success. De Bosscher et al. (2009); and Truyens et al. (2014) found supporting athletes to be essential for the development of each country's championship sport, which is in line with the results of the present study. Given the importance of this field in medal-setting in international events, along with the previous factors, swimmers' success in international events can be enhanced by increasing the share of funding and financial resources for the sport. In this regard, De Bosscher et al. (2009); Elango et al. (2019); Ghahremantabrizi et al. (2017); Majumder and Choudhury (2014); Seifpanahi Shabani and Haji Hasani (2018); and Truyens et al. (2014) pointed out the

importance of financial support, which is in parallel with the results of the present study. However, the results of Valenti et al. (2020) showed that financial support was not an important factor in the success of European women's national football teams in international competitions. The results of their research were inconsistent with the findings of the present study. In conclusion, it should be said that financial resources are the driving force for any planning without which no activity will happen or successful. Swimming Federation board must use all available capacities and provide more financial resources with comprehensive marketing planning. The advantages and high medal-winning potential of swimming give managers a high bargaining power to gain financial support from both public and private sections.

The technical and executive heuristic pattern includes the active participation of swimmers in different competitions and international tournaments and this was the fourth factor in the success of national swimmers is international events. The managers of the Ministry of Sport and youth and the Swimming Federation should consider the importance of this factor for the participation of swimmers in international competitions and provide opportunities for swimmers to participate in international events so that swimmers can gain enough experience for future contests. Majumder and Choudhury (2014) considered technical factors to be effective in the success of swimmers in swimming competitions. Seifpanahi Shabani and Haji Hasani (2018); and Truyens et al. (2014) identified preparatory competitions and participation in national and international competitions as success factors in international events.

Managerial discussions include the coordination of regular and continuous national and provincial championships, which inevitably coincide with national and provincial swimming competitions, and which can help swimmers succeed in international events. Regarding the managerial factors, Ali a national swimming team member points out: "The Swimming Federation management is not stable and there is a lack of unity among the procedures, which have caused confusion. This issue has prevented the pursuit of a long-term talent identification program that is a prerequisite for international success". In the field of management factors Firoozi et al. (2012) as well as Ghahremantabrizi et al. (2017); Majumder and Choudhury (2014); and Singh and Hu (2008) have made similar remarks and noted the importance of sound management and efficient planning. These findings are in line with the results of the present study.

Insufficient media coverage of subjects related swimming was also in this category. Media has a great impact on the people's views regarding different matters. What media offers will lead societies to the desired direction (Rowe, 2015). Razavi et al. (2013) argue that television coverage plays an important role in the development of sports, especially championship sports. Lack of attention to swimming in Iranian TV shows has been evaluated critical. Regardless of the reasons, Iranian television - which is governmental- mostly focuses on a few specific sports, including soccer. A review of Iranian sports magazines also shows that a high percentage of the magazine's headlines are related to soccer and there is very little news and information about swimming. Swimming Federation managers need to provide negotiations platform with media to attract their attention to swimming. Increasing media coverage, especially broadcasting domestic and international competitions and events on television, can also be effective in developing financial resources.

Education and paying attention to coach's knowledge based on modern and up-to-date science is another priority. Iranian swimmers need to be educated and trained according to the latest techniques in the science of swimming. In this regard Brouwer et al. (2015); De Bosscher et al. (2009); Elango et al. (2019); Firoozi et al. (2012); Valenti et al. (2020); Seifpanahi Shabani and Haji Hasani (2018); and Truyens et al. (2014) pointed out the importance of using first-rate coaches and enhancing coaches' knowledge. Close attention is suggested to the identified factors in the current study as obstacles to the success of Iranian swimmers in international competitions, by the responsible bodies (Ministry of Sport and Youth Affairs, the Iranian Swimming Federation, and the National Olympic Committee). Based on these findings, professional and first-class coaches who continuously participate in training courses to improve their abilities and skills need to be recruited into national teams. These coaches are required to pay attention to talent identification and not having a short-term vision. Due to the fierce competition in international events, relying on traditional teaching methods will not work. Furthermore, coaches' effective communication with athletes is an essential factor that impacts the athletes' performance.

Conclusion

Nations have a vested interest in performing well in sport in general, but also at mainstream international events. In addition to national pride and socioeconomic impacts, taking part in these global rituals portrays stability and prestige at the world stage, while boosting strategic investments, support and resources aimed at improving capabilities and the sport system. The popularity of swimming coupled with the long history of the formation of the Iranian Swimming Federation led this research project to explore the ways Iran could improve its swimming system in order to perform better internationally. Using the Q methodology, the study analyzed experts and main stakeholders' views on the challenges in the Iranian Swimming sport system and its overall capacity in achieving success in world competitions.

In light of the results highlighted in this article, the attitude-oriented pattern expressed the need for changing attitudes regarding swimming, empowering members of the swimming federation while focusing on early identification of swimming talent in schools and clubs. Sport facilities and swimming pools came secondly within the infrastructure-oriented pattern that goes hand in hand with the financial-oriented one that emphasizes on financing and the ability to attract sponsors that would be essential to succeed globally. The technical and executive pattern recommends more participation of swimmers at international events while increasing cooperation between the federation and school boards for women swimming and first-class coaching development and opportunities. All this should be reinforced and implemented through solid planning and continuous organized coordination within the sport system and the different stakeholders, all issues that also require training, and up to date swimming related education and science-based knowledge and expertise.

Acknowledgments

I would like to acknowledge swimming specialists that participate in this research.

Conflicts of Interest

There is no conflict of interest.

Funding

The authors received no financial support for the research, authorship and/or publication of this article.

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