

Formation of national volleyball teams: the impact of player migration

OLHA SHLONSKA¹, OLHA BORYSOVA², VIKTOR KOSTYUKOVICH³, YULIA YAKUSHEVA⁴,
VADYM ADAMCHUK⁵, YEVENIIA STRELNYKOVA⁶

^{1,2}National University of Ukraine on Physical Education and Sport, UKRAINE

^{3,5}Vinnitsia State Mykhailo Kotsyubynskyi Pedagogical University, Vinnitsia, UKRAINE

⁴Vinnitsia National Pirogov Medical University, Vinnitsia, UKRAINE

⁶Kharkiv National Pedagogical University named after H.S. Skovoroda, UKRAINE

Published online: August 31, 2024

Accepted for publication : August 15, 2024

DOI:10.7752/jpes.2024.08216

Abstract.

Problem statement: The evolution of team sports is closely tied to the migration of highly skilled players and their concentration in the world's top leagues. Approach: The formation of national volleyball teams is influenced by the migration of leading players to premier international leagues, considering their global rankings. This migration enhances the teams' competitive performance in major international tournaments. Results. The results of the study show that today, there is a migration of volleyball players, members of national teams to the national championships of Italy and Poland, for women in Turkey and Italy, which can be traced to the migration of legionnaires of the national teams of the USA, Serbia, France, and Brazil. It is confirmed that migration processes in volleyball increase after a successful performance at the Olympic Games, manifested in the transition of leading players to the world's major leagues. The analysis of the migration of players of the Olympic Games and World Championships winners shows that a significant increase in migration processes in world volleyball has been observed since 2012 (48.3% for men, 39.2% for women) and will reach its maximum value in 2022 (53.0% and 46.8%, respectively). The analysis of the relationship between migration rates and the ranking based on the results of the 2020 Olympic Games showed a positive correlation ($r = 0.587$) in the formation of men's national teams and a negative correlation ($r = -0.373$) in women's teams. There are also strong correlations between migration rates and the country's economic development level, highlighting the significant economic impact of volleyball ($r = 0.287$ for men, $r = -0.368$ for women). Conclusions. The analysis of the development of modern volleyball has made it possible to establish that today, its further professionalization is taking place through the formation of professional structures in the Olympic system of competitions. The use of modern international experience in the formation of national teams, considering the factors of globalization, can be used in other team sports.

Keywords: Competitions, international leagues, legionnaires

Introduction.

In the conditions of fierce competition observed today in volleyball, which is intensified by globalization, the sports industry is trying to achieve the highest sports results in the international arena by constantly searching for highly qualified players, which leads to migration processes (Tainsky & Stodolska, 2010; Book et al. 2021).

Migration of athletes at the current stage of development of team sports, including volleyball, is global, which is manifested in the movement of players within countries and continents and significantly affects individual and team performance (Poli, 2019; Tertullian et al., 2020; Rocznik et al., 2016). One of the main factors of migration highlights the transition of highly skilled athletes from lower-level leagues and their concentration in strong leagues of the world, which is manifested in the presence of migration flows of players, resulting in an increase of legionary players in national championships of different countries (Koba et al., 2023; Araújo et al., 2020). On the one hand, this trend contributes to the transition of the strongest and most talented players in favor of professional leagues in countries with certain achievements in certain playing sports, weakening the national championship. On the other hand, the players-legionnaires who are part of the national teams of countries can demonstrate their professional abilities, which were acquired by gaining international experience and participation in leading foreign clubs. The presence of this trend will allow for the strengthening of the national teams with trained players, which can affect the effectiveness of competitive activity in the most important international competitions.

Over the past 20 years, migration processes in volleyball have become widespread due to changes in market relations between clubs and foreign players, which has contributed to the commercial orientation of attracting talented athletes to various world's top leagues (Dadelo et al., 2014; Afanasieiva, 2019; Budak & Kara,

2022). Today, migration processes are observed in modern and reserved professional sports, which also affects the formation process of national teams. This increases the relevance of selecting players who have gained international professional experience in the world's top leagues and have completed several Olympic cycles, which is the main factor in the successful performance of national teams in the Olympic Games and World Championships. Therefore, identifying trends in the formation of national teams in volleyball, taking into account the processes of player migration, requires scientific substantiation and will allow us to identify strategic ways to improve the efficiency of competitive activity.

It becomes interesting that existing international studies mainly concern the peculiarities of players' migration processes in the club competition system (Tumer & Koçer, 2017; Ruxanda et al., 2013; Rojo, 2020), the relationship between nationality, citizenship, and migration in the formation of national teams (Oonk, 2021; Van Campenhout, van Sterkenburg and Oonk, 2019).

Today, there is a universal opinion of experts who claim a positive contribution of foreign players to the development of the club competition system, which can be explained by the acquisition of specific skills in the world's leading leagues, which can affect the performance of national teams (Xing Wang et al., 2020; Sobol, 2021; Mulazimoglu, 2021; Tavares et al., 2019). It becomes evident that the more talented and unique players appear in the national championship, the better the national team results. At the same time, some experts point to the negative processes caused by the migration of national team players, which is confirmed by the lack of chemistry of the leading team in international competitions (Lago-Peñas et al., 2019; Jiang Ren-Shiang, 2017; Da Silva, 2019).

Surprisingly, the analysis of the formation of national volleyball teams, considering the competitive activity of legionnaire players in the Olympics and World Championships, remains insufficiently studied. In our opinion, it is essential to identify the world's top leagues in men's and women's volleyball, where the most significant number of legionnaire players - members of national teams - is concentrated. It should be noted that it is the success of performances in the most significant international competitions that increases the process of migration of national team players to the strongest leagues in the world, and, conversely, the lower the international ranking of the team, the lower their demand for professional leagues in the world. Having analyzed the primary studies in team sports, we have identified the positive impact of player migration and the success of national teams.

However, in this context, we have not found similar studies in volleyball concerning the peculiarities of forming national teams considering migration factors, the concentration of players in the strongest leagues in the world, and the relationship between international rankings and migration processes. In this regard, our work aims to determine the peculiarities of forming men's and women's national teams in volleyball, taking into account the processes of international migration.

Material and methods

Participants

The stated experiment analyzed the indicators of 11 men's and seven women's national teams (1240 athletes) who were winners of the Olympic Games and World Championships from 2008 to 2022. In order to determine the causal relationship between migration indicators, international team rankings, and the economic development of countries, the migration paths of volleyball players from men's (144 athletes) and women's (144 athletes) national teams that participated in the 2022 World Cup were analyzed.

Procedure

In the experimental research, the migration corridors of each legionnaire player were studied, taking into account their nationality, club, and country to which the player migrated, his role, and age. Based on the obtained data, the peculiarities of the formation of the national leading teams were determined, considering the number of legionary players included in their composition in different periods. Along with this, the main objective of our study was to identify legionary players in different world leagues, which we released by the migration rates of the men's national teams of the USA, Serbia, and France and the women's teams of Brazil, USA, and Serbia.

The analysis of the obtained experimental data allowed us to determine the current trends in the formation of national volleyball teams, taking into account the processes of migration and the ratio of players-legionnaires in the national teams (both leaders and outsiders) from 2008 to 2022.

Statistical analysis

The data obtained as a result of the analysis of competitive activity were processed using standard statistical methods included in the Statistica 7.0 (Stat Soft) and MC Exel on a personal computer, including the method of averages based on the calculation of the mean value (\bar{x}), standard deviation (S), the percentage of legionnaires in each national team, the relationship between migration rates and the international ranking of teams, and the economic development of the country, using Pearson's correlation coefficient (r).

Results.

Migration in high-performance sports is the transition of talented athletes from one country to another with a change of continent and confederation. Therefore, to study the trends currently present in team sports, particularly in volleyball, which relates to the problem of forming the starting lineup of national teams, it is necessary to study the patterns of international migration, which is a significant factor in globalization. In basketball, the main factor that contributed to the processes of player migration was the interest of the media and the broadcast of the Olympic Games and NBA competitions in the 1990s, which contributed to the formation of new professional basketball leagues in different countries (Australia, Japan) and led to an increase in the number of foreign players (Jiang Ren-Shiang, 2017; Gaenssle & Feddersen, 2023).

This trend is analyzed in Demachi's study (2003), where the author points to an increase in basketball players in the 1990s from 400 thousand to 1 million in Japan. In football, one of the indirect factors of migration is 1) continuation of players' sports careers based on further professional development; 2) analysis of countries where football is intensively developing and countries have specific achievements in the Olympics and World Cups; 3) availability of football academies and Olympic training centers, which ensures practical training of the Olympic reserve; 4) improvement of the club competition system (Nouraie et al., 2023; Metelsk et al., 2023; Marquez-Velarde et al. 2023).

The phenomenon of migration is also observed in volleyball. The free movement of skilled players from one club to another between different countries and continents has increased significantly over the past 25 years, as some restrictions on transfer market situations have been lifted, resulting in a commercially oriented club training system. The study by Vanessa Silva Ponte et al. (2018) analyzes the peculiarities of volleyball players' migration in Brazil, where volleyball is a national sport due to the achievements of the national and women's national teams. Volleyball in Brazil gained intensive development due to the actions of the president of the South American Volleyball Confederation de Carlos Arthur Nuzman, who proposed to unite sports clubs, media, and athletes into a single system and provided an opportunity for sponsors and patrons to finance clubs of different leagues and national teams in official international competitions, which led to the attraction of qualified coaches and the selection of talented players (Tumer & Koçer, 2017; Mostaert et al. 2022;). It was in the 1980s that there was a demand for Brazilian volleyball players in the European labor market, which resulted from their successful performance at the Olympic Games and World Championships. A striking example is the current coach of the men's national team, Renan Dal Zotto, who, as part of the national team, after winning silver medals in the 1982 World Championships and the 1984 Olympic Games, signed contracts with well-known Italian clubs "Pirelli", "Parma", "Ravenna".

Thus, the following factors are reasonable prerequisites for the development of the process of international migration in volleyball (Risser, 2020; López-Serrano et al., 2023; Tsoukos, 2019):

- a high level of competition in the national championship and in the national team to participate in the most important international competitions;
- the need for further professional development through the application of innovative and new scientific and methodological approaches concerning a particular country;
- high level of material and technical conditions and salaries;
- motivation for professional development and self-improvement.

However, along with the existing positive aspects of international migration, this process has negative consequences. The main ones include transferring young and promising players capable of achieving the highest sports results to other world leagues. In this situation, there is not only a loss of talent but also a rush to train a player, which can negatively affect the development of his potential and the duration of his sports career. The result is that young players mostly migrate to mid-level global leagues instead of the strongest European leagues, where the doors are open for high-class athletes and national team members. In this regard, it is necessary to analyze the migrant players included in the national teams to participate in the most significant official international competitions from 2008 to 2022, as reflected in Table 1.

As a result of the analysis, it was determined that the highest rates of legionnaire players in the national teams are represented in the national teams: USA, where the average volume of legionnaire players is 93.6%, Serbia (80.3%, with the highest value in 2008 - 83.3% and 2022 - 85.7%), France (70.4%, with the highest values in 2016 and 2020 - 64.2% and 83.0%, respectively) and Germany (62.8% with the highest value in 2012 - 91.6%). Among the current leaders of world volleyball, there is an increase in the migration of Brazilian volleyball players, which is especially evident in the 2014 and 2022 World Championships (50%). At the same time, there is a decrease in the transfer of talented players from the national championships of Italy and Poland, which may result from favorable contractual conditions for legionnaires and contribute to the strengthening of the national championships of these countries. The European training system also influences modern world volleyball (out of 10 represented winning teams, six countries are located on the European continent), which can significantly impact the justification of international migration trends.

Table 1. Indicators of migration of players of volleyball teams, winners of the Olympic Games and World Championships in the period from 2008 to 2022

Команда	Performance of legionnaires who participated in the Olympics and World Championships															
	2008*		2010**		2012*		2014**		2016*		2018**		2020*		2022**	
	X	%	X	%	X	%	X	%	X	%	X	%	X	%	X	%
male																
Brazil	5	42	5	35,7	3	25	7	50	5	42	4	28,6	5	41,6	7	50
Italy	0	0	0	0	2	16,6	2	14,3	1	8,3	2	10	0	0	0	0
Poland	5	41,6	3	20	4	28,6	4	28,6	2	16,6	4	28,6	4	28,6	1	7,1
Russia	0	0	3	16,6	0	0	0	0	0	0	–	–	0	0	0	0
USA	12	100	13	92,8	12	100	12	85,7	12	100	13	92,8	12	100	11	78,6
Germany	10	83,3	5	31,2	11	91,6	12	85,7	–	–	7	33,3	–	–	8	51,7
Cuba	–	–	3	21,4	–	–	0	0	3	25	8	36,3	–	–	12	85,7
Serbia	10	83,3	11	78,6	11	91,6	10	66,6	–	–	17	77,2	–	–	12	85,7
France	–	–	6	42,8	–	–	9	64,2	10	83,3	11	78,6	10	83	10	71,4
Argentina	–	–	5	35,7	4	33,3	6	42,8	5	41,6	10	47,6	12	100	14	100
female																
Brazil	4	33,3	1	7,1	4	33,3	2	14,3	6	50	7	31,8	5	41,6	7	50
USA	11	91,6	12	85,7	11	91,6	14	100	11	91,6	14	100	12	100	13	92,8
China	1	8,3	0	0	0	0	1	7,1	0	0	1	7,1	2	16,6	3	21,4
Serbia	8	66,6	11	78,5	11	91,6	13	92,8	12	100	12	100	12	100	14	100
Japan	3	25	1	7,1	2	16,6	2	9,5	1	8,3	6	27,2	1	8,3	2	9,5
Italy	2	16,6	2	14,2	4	33,3	4	28,5	2	16,6	0	0	1	8,3	1	7,1
Russia	1	8,3	4	28,6	1	8,3	0	0	1	8,3	2	9,1	1	8,3	–	–

Note: *– Olympics; **– World Championship

In women's volleyball, a much smaller number of countries have won the Olympic Games and World Championships from 2008 to 2022 compared to men's national teams. There is a much smaller number of national teams with high migration rates, which indicates an effective training system in these countries and a robust national championship, which constitutes the necessary prerequisites for long-term practical training of national teams. The undisputed leader in terms of quantitative and qualitative indicators of migration processes is the US national team, with an average of 94.1%, with the highest values (100%) in 2014, 2018, and 2020. This is due to many volleyball academies that train gifted young athletes and centralize the preparation of the Olympic reserve for participation in the national championship and significant continental competitions. There is also a tendency to increase migration processes in the Serbian women's national team (from 2016 to 2020, the national teams are formed only by legitimate players, which is 100% of the total number of players). At the same time, the Chinese national teams have the smallest number of legionnaires (an average of 7.5%, with the highest number in 2020 and 2022 at 16.6 and 21.4%). While men's volleyball is currently experiencing a gradual migration of players to European leagues in order to gain international professional experience as leading national team players, women's volleyball is, on the contrary, attracting leading players to the club training system (Melissa Vargas ("Tianjin"), Kim Young-Kun, Jordan Larson ("Shanghai"), Diane Boskovic ("Shenzhen")). However, to develop the national championship and create a high level of competition in 2022, the Chinese Volleyball Federation decided to limit the number of legionnaires to 1 player (the smallest in the world), which, in our opinion, may be political. The specifics of the Chinese championship are significantly different from those of European countries, as reflected in its duration (it ends earlier than the transfer window in Europe). Therefore, in such conditions, legionnaire players consider participating in the Chinese championship to sign lucrative contracts with a subsequent transfer to European clubs.

Figure 1 shows the dynamics of the ratio of legionnaire players who were members of national volleyball teams participating in the Olympic Games and World Championships.

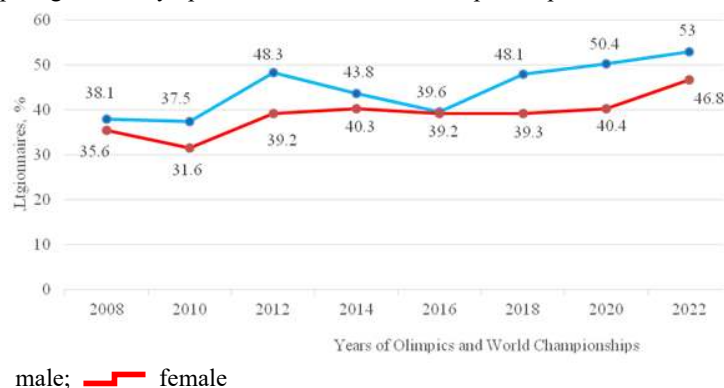


Fig. 1. The dynamics of the ratio of legionnaire players who were members of national teams participating in the Olympic Games and World Cups from 2008 to 2022, %.

The analysis results of the formation of national men's volleyball teams show a significant increase in the number of legionnaires who played in other international leagues in 2012 (48.3%). At that time, the labor market was in demand for volleyball players from the USA, Serbia, and Germany. Since 2018, there has been a gradual increase in the number of legionnaire players from 48.1% to 53.0% in 2022 due to the focus on training national teams with the participation of players in several Olympic cycles and further emphasis on training the immediate reserve as the leading team composition in the next Olympic Games and World Championships. In the formation of women's national teams, there is a tendency for a more gradual increase in the number of legionnaire players, starting in 2012 (39.2%) and reaching its maximum value in 2022 (46.8%).

High-performance sports and team sports, in particular, are increasingly becoming a business and entertainment sector, with volleyball ranking third in popularity after football and basketball. The global pandemic has had a significant impact on the development of the club volleyball competition system due to the bankruptcy of sponsors and reduced budgets for financing teams, which has led to a revision of contractual terms for players in various global leagues, taking into account the end of not only national championships but also international official competitions. While in France, the government ensured that team players' salaries were paid at 84% (a 7% reduction), in Italy, which has the most significant number of legionnaires, the reduction was 15-20%. In this regard, countries with low national championships refused to attract foreign players, which significantly affected their preparations for the Olympic Games held in 2021. An example is the German men's national team, where most of the teams had legionnaires in their line-up (only one player with a German passport was on the court). In our opinion, this was the main factor that influenced the process of preparing the national team and its failure to qualify for the Olympic Games.

A critical issue is determining the peculiarities of the international migration of volleyball players to different world leagues. The level of the strongest leagues is determined by the success of clubs at the start of the season, the availability of an influential player training system, and the number of legionnaires and members of the national teams of the sending country. The analysis of this area of our research will allow us to identify current trends and scientific directions in the formation of national teams in volleyball, taking into account the inclusion of legionnaire players who gained professional experience in the previous Olympic cycle. Suppose the leading teams (Italy and Brazil) have a slight migration of national team players. In that case, a detailed analysis of the formation of these processes in countries with a lower level of volleyball development is required. Tables 2 and 3 show the ratio of legionnaire players, members of men's and women's national teams, that participated in the Olympic Games and World Championships from 2008 to 2022.

Table 2. The ratio of legionnaire players in the men's national volleyball teams USA, Serbia, and France based on the results of performances in the Olympic games and World Championships from 2008 to 2022, %.

Countries that accept legionnaire players	National teams					
	USA		Serbia		France	
	X	%	X	%	X	%
Italy	25	25.7	33	46.4	25	44.6
Russia	25	25.7	8	11.3	3	5.4
Poland	16	16.6	7	9.8	13	23.2
France	6	6.2	3	4.2	–	–
Germany	6	6.2	4	5.6	–	–
Turkey	3	3.1	4	5.6	6	10.6
Greece	3	3.1	2	2.9	1	1.8
Brazil	3	3.1	3	4.2	1	1.8
Korea	3	3.1	2	2.9	1	1.8
Austria	3	3.1	–	–	–	–
Israel	2	2.1	1	1.4	–	–
Qatar	1	1.0	–	–	3	5.4
Indonesia	1	1.0	–	–	–	–
Iran	–	–	1	1.4	–	–
Slovenia	–	–	3	4.2	–	–
Romania	–	–	–	–	–	–
China	–	–	–	–	3	5.4

An analysis of the migration of highly qualified volleyball players and members of national teams in the period from 2008 to 2022 shows that the most significant number of players is concentrated in the strongest European clubs, "Modena", "Monza" and "Perudja" (USA – 25/7%, Serbia – 46.4%, France – 44.6%). Notably, most of the leading American volleyball players (Matthew Anderson, William Priddy, and Aaron Russell) who have played in three Olympic cycles were part of these teams, which significantly strengthened the Italian national championship. An interesting fact is that the achievements of the US men's national team in the international arena in 2008 led to an increase in migration processes. In this case, players receive high salaries

and are provided with a transition to teams with a higher international rating. There is also a tendency for players to migrate to the Polish championship (16.6% of US players, 9.8% of Serbian players, and 23.2% of French players), where the leading clubs are still "PGE Skra", "Radom" and "Resovia". An interesting fact is the migration of national team players to the Russian championship, which by 2022 concentrated a significant number (28.2%) of the leading American players in top-level clubs ("Zenit Kazan", "Lokomotiv Belogorye"): David Lee, Maxwell Holt, and Eric Shoji. At the same time, in the period from 2018 to 2022, well-known Serbian volleyball players appeared in the Russian club system: Petar Krsmanović, Marko Ivočić, and Dražen Ljuburić, which ensured the participation of lower-ranked teams in the national championship. Today, there is a significant decrease in the number of legionnaires in the Russian championship, where the club training system focuses on attracting Serbian and Bulgarian players (who do not have high achievements in the national teams). Thus, it can be stated that today, in modern volleyball, leaders are changing among the strongest world leagues, where clubs of the Italian and Polish championships occupy high rankings.

However, at the same time, there is a tendency to change migration corridors in the club competition system, which is aimed at further transfer of the most outstanding athletes: Ricardo Lucarella (Brazil), Bartosz Kurek (Poland), Aaron Russell (USA), and Nimir Abdel Aziz (Netherlands) to the Japanese Volleyball League due to million-dollar contracts in the top-ranked teams and \$200,000 in the bottom, which changes the situation on the transfer labor market. Unlike the Italian system of selecting legionnaire players, in Japan, a team can include no more than three legionnaires in its application, one of whom must be from the Asian continent. This approach will allow for attracting top and well-known volleyball players without disrupting the system of training the nearest reserve.

championship: 28.6% ("Imoko Volley", "Piacenza"), 18.5% ("Fenerbahce", "Ejzadzhibashi"), and 11.1% ("Hisamitsu Pharmaceutical Springs", "Toyota Auto Body Queenseis"). The most significant volume of volleyball players on Serbian national teams is also concentrated in the championships of Turkey (26.8%), Italy (19.3%), and Romania (14.0%).

Table 3. The ratio of legionnaire players in women's national volleyball teams USA, Brazil and Serbia based on the results of performances in the Olympics and World Championships in the period from 2008 to 2022, %.

Countries that accept legionnaire players	National teams					
	USA		Brazil		Serbia	
	X	%	X	%	X	%
Turkey	20	18.5	17	47.4	25	26.8
Italy	31	28.6	7	19.5	18	19.3
Russia	7	6.5	5	14.0	2	2.1
Azerbaijan	7	6.5	1	2.7	4	4.3
Switzerland	4	3.7	1	2.7	9	9.7
Spain	–	–	1	2.7	–	–
Japan	12	11.1	1	2.7	3	3.2
USA	–	–	1	2.7	–	–
China	8	7.4	1	2.7	1	1.1
Poland	4	3.7	1	2.7	7	7.6
Brazil	7	6.5	–	–	–	–
Germany	4	3.7	–	–	3	3.2
Korea	2	1.9	–	–	1	1.1
Czech Republic	2	1.9	–	–	1	1.1
Romania	–	–	–	–	13	14.0
France	–	–	–	–	5	5.4
Grece	–	–	–	–	1	1.1

The analysis of the migration of highly qualified volleyball players and members of national teams to various international leagues shows that today, there is a need for Serbian, American, and Brazilian volleyball players in the national championships of Italy and Turkey. The majority of Brazilian volleyball players (47.4%) concentrate on the Turkish championship ("Fenerbahce", "Vakyfbank"), and 19.5% concentrate on the Italian championship ("Savino Del Bene Scandicci", "Igor Gorgonzola"). Athletes of the US national teams mainly transfer to clubs of the Italian championship: 28.6% ("Imoko Volley", "Piacenza"), 18.5% ("Fenerbahce", "Ejzadzhibashi"), and 11.1% ("Hisamitsu Pharmaceutical Springs", "Toyota Auto Body Queenseis"). The most significant volume of volleyball players on Serbian national teams is also concentrated in the championships of Turkey (26.8%), Italy (19.3%), and Romania (14.0%).

According to the research results, most athletes today are concentrated in European leagues, the leading training centers in modern volleyball, taking global trends into account. The intensive development of volleyball in these countries, the transformation of sport into a business industry, high salaries for foreign players, the high professional competence of coaching staff, and material and technical facilities have become the main factors that have influenced the migration in volleyball. It should be noted that migration processes have increased in 1948-----

those countries where national teams have successfully performed at the Olympics and World Championships. An example is the US men's national team, whose players became in demand after winning bronze medals at the XXXI Olympic Games in Rio de Janeiro in 2016 and signing contracts with well-known European clubs. It should be noted that the host country's economic development also influences international migration. Table 2 shows the relationship between the migration of national team players, the economic development of host countries, and the international ranking of teams.

The analysis of the relationship between migration and the ranking of national teams based on their participation in the 2020 Olympic Games confirms a direct correlation ($r=0.587$), which indicates that in men's volleyball, there is a tendency to attract national team players to the strongest leagues in the world who have won prizes in official international competitions. The information concerning the formation of women's national teams is fascinating. Today, there is a negative correlation ($r=-0.373$), which is explained by the need for high-class volleyball players in the labor market, especially for American, Serbian, and Brazilian athletes, who are currently the leaders in world volleyball. At the same time, there are relatively low correlations between migration and economic development in men's national teams ($r=0.287$) and women's national teams ($r=-0.368$).

Table 4. Relationships between the migration of volleyball players from internationally ranked teams and the economic development of the country hosting the Legionnaires in 2022

Male					Female				
National team	Performance rating in the Olympics 2020	Migration in 2022, %	S	Total GDP, trillion dollars in 2020	National team	Performance rating in the Olympics 2020	Migration in 2022, %	S	Total GDP, trillion dollars in 2020
Italy	6	6,1	58,6	2,26	USA	1	92,8	63,5	25,46
USA	10	93,7	33,2	25,46	Brazil	2	50,0	18,6	2,000
France	1	61,6	0,4	3,05	Serbia	3	100,0	71,1	0,063
Poland	5	21,3	8,6	0,691	Korea	4	7,1	26,3	1,674
Brazil	4	39,3	23,8	2,000	Turkey	5	9,5	23,8	3,355
Japan	7	41,6	21,4	4,232	Italy	6	7,1	26,3	2,264
Argentina	3	57,2	11,0	0,389	Dominican Republic	8	78,5	48,5	0,113
Tunisia	11	93,7	33,2	0,046	China	9	21,4	11,3	12,720
Canada	8	91,6	31,0	2,138	Japan	10	9,5	23,8	4,232
Iran	9	82,3	21,3	0,413	Argentina	11	71,4	41,1	0,389
Venezuela	12	93,7	33,2	0,195	Kenia	12	7,1	26,3	0,113
X		62,0	25,1	3,715			32,2	34,6	4,760
$r=0,587$					$r=-0,373$				
$r=0,287$					$r=-0,368$				

Discussion

This article examines the peculiarities of forming men's and women's national volleyball teams that won the Olympic Games and World Championships from 2008 to 2022. The processes of international migration in team-game sports, including volleyball, have significantly increased over the past 20 years, which characterizes the impact of globalization on their development. Most studies on athletes' migration have been considered from the perspective of management theory, with the subsequent identification of political, socio-economic, and cultural factors that influence its course (Campenhout & Sterkenburg, 2019; Risser, 2020; López-Serrano, 2023). Interestingly, the issue of the peculiarities of the migration of athletes in volleyball in the international bibliography is found only in the work of Pontes et al., V.S. (2018), which aroused interest in this scientific direction, especially concerning the formation of national teams.

The empirical results of our research allow us to reveal two directions that influence the formation of national teams in volleyball. Firstly, it was found that the migration of volleyball players who were members of men's and women's national teams increased with their international ranking. This is primarily because the successful performances of national teams at the Olympic Games led to an increased interest of critical athletes in the international club system of competition. In other words, the migration of athletes depends on sports results, which is confirmed in the study by Lago-Peñas Carlos et al. (2019). Secondly, the ratio of legionnaire players in different world leagues was determined, which formed a prerequisite for predicting the success of national teams, considering the international ranking and the strength of the host country's national championships. It is determined that most of the leading players who were in the men's national volleyball teams were concentrated in the Italian championship and in the women's in the Turkish championship, which indicates

their high rating among other world leagues, where the key factors are the effectiveness of competitive activity in club world championships and European cups.

An essential component of our study is determining the relationship between migration rates in the formation of national teams in 2022 and the ranking in the standings based on the results of performances in the 2020 Olympic Games. It is determined that in men's national teams, the migration process depends on the ranking place; in women's teams, on the contrary, the lower the team's ranking, the higher the migration. This is because women's volleyball, at the current stage of its development, has seen a change of leaders, where, along with the USA, Italy, and Brazil, the bronze medals of the 2020 Olympic Games were won by the Serbian national team, 100% of whose athletes gained professional experience in the leading clubs of the European confederation (Turkey: 6 volleyball players, Romania: 3; Brazil and Poland: 1 each). Concerning the impact of the economic development of the 'donor country' on the level of migration, insignificant positive correlations were found for men ($r = 0.287$) and harmful for women ($r = -0.368$). The results obtained indicate that in addition to the presence of legionnaires in the national teams, considerable attention should be paid to the migration of players to the world's strongest leagues, building an effective training system that should be based on the specifics of training players of different roles, taking into account global trends.

Conclusion

1. The development of the modern variety of higher achievements, in particular its team games, is inextricably linked to the processes of globalization, where the main feature is the migration of athletes and depends on the following factors: recognition through professional growth, improvement of social status based on higher wages, exchange of cultural and national values in order to expand international contacts and participation in the national championship of another country or as part of national teams.

2. Based on the theoretical analysis, it was found that in the period from 2008 to 2022, the highest migration rates among men's national team players were in the USA (93.7%), Serbia (80.4%), France (70.4%), Germany (62.8%), and for women, the USA (94.1%), Brazil (32.6%), and Serbia (91.1%), which affected the results of their performance in the Olympics and World Championships in certain periods due to the transition of athletes to the strongest leagues in the world.

3. The statistical analysis results show that the migration of players is influenced by the ranking of the national team in the previous Olympic cycle (for men, $r = 0.587$; for women – $r = -0.373$). The indicator of economic development of the country ($r = 0.287$ and $r = -0.368$, respectively) has a very low correlation, which indicates the need to build an effective training system, strengthen the national championship, and increase the and increase the availability of high-class specialists and Olympic training centers.

4. The study of the peculiarities of migration processes in volleyball allowed us to identify the main trends in the formation of men's and women's national teams, where the main factor is high sports results in the Olympic Games and World Championships, which is confirmed by the transition of leading players to the best clubs in the world with a high international rating, and, conversely, players of national teams who did not become prize-winners in the most important international competitions move to clubs with a low rating.

5. The analysis of the development of modern volleyball has revealed that today, its further professionalization is taking place through the formation of professional structures in the Olympic competition system. The use of modern international experience in the formation of national teams, considering the factors of globalization, can be used in other team sports.

Conflicts of interest - No conflicts of interest are to be declared.

Author Contributions: Conceptualization – O.S. and O.B.; methodology and statistical analysis –V.K.; data collection – Y.Y., Y.S.; writing – original draft preparation – O.S.; writing – review and editing – O.B.; visualization – V.A. All authors have read and agreed to the published version of the manuscript.

Reference

- Afanasieiva N., Svitlychna N., Bosniuky., Khmyrov I., Ostopolets I., Kholodnyi O., Shenderuk O., Tabachnyk I., Shevchenko O., Bilotserkivska Yu. (2019) Psychotechnology of volleyball team efficiency formation *Journal of Physical Education and Sport*, 19(2), 1071-1077. [https://DOI:10.7752/jpes.2019.02155](https://doi.org/10.7752/jpes.2019.02155).
- Araújo C.R.P., Tosini L., Freire A.B., Costa G.D.C.T., Meira J.R. (2020). Reception-attack relation in men's and women's volleyball during the Rio 2016 Olympics, *Journal of Physical Education and Sport*, 20(3), 2008-20012. [https://DOI:10.7752/jpes.2020.s3271/](https://doi.org/10.7752/jpes.2020.s3271/).
- Book R.T; Stambulova N. & Henriksen K. (2021) Professional migration from the United States to Europe: Composite vignettes of black male basketball players from underserved communities, *psychology of sport and exercise*, 54. [https://DOI:10.1016/j.psychsport.2021.101900](https://doi.org/10.1016/j.psychsport.2021.101900).
- Budak G. and Kara I. (2022). A multiobjective mathematical model to form the best team at sports clubs: team harmony and player performance objectives. *Team performance management*, 28 (1), 145-159. <https://doi.org/10.1108/TPM-06-2021-0047>.

- Campenhout G. V., Sterkenburg J. V. (2019). The diversification of national football teams: Using the idea of migration corridors to explore the underlying structures of nationality changes amongst foreign-born players at the football World Cup. *International Review for the Sociology of Sport*, 56(1). <https://doi.org/10.1177/1012690219892849>.
- Da Silva LHM, Kerkoski, MJ, Hodeck A. (2019). Terminal actions at Brazil's Volleyball League. *Journal of human sport and exercise*, 2019, 14, 1322-1324. <https://doi.org/10.14198/jhse.2019.14.Proc4.82>.
- Dadelo S, Turskis Z, Zavadskas EK, Ruta D. (2014). Multi-criteria assessment and ranking system of sports team formation based on objective-measured values of criteria set. *Expert Systems with Applications*, 41(14), 6106–6113. <https://doi.org/j.eswa.2014.03.036>.
- Demachi I. (2003). Global strategy of the NBA on the viewpoints of globalization of Labor and Culture in O. Ebichara (Ed.) *Introduction of modern sports sociology (summary in Japanese)*, 2003, 118–125.
- Gaenssle S & Feddersen A (2023). Economics of Superstars in Basketball: An Empirical Analysis of WNBA and NBA. *Book of Abstracts - the 14th ESEA Conference on Sport Economics*, 79.
- Jiang Ren-Shiang, Lee Ping-Chao (2017). An Evolution of the Migration of Taiwanese Female Basketball Players: From the 'American Dream' to the 'Chinese Dream'. *The International Journal of the History of Sport*, 33(18), 2253–2270. <https://doi.org/DOI:10.1080/09523367.2017.1311865>.
- Koba T.H, Nagel M.S. & Kidd V.K. (2023). An Exploration of Professional US-Based Basketball Players Competing in Turkey, *Journal of global sport management*, 8(1), 161-182. <https://doi.org/DOI:10.1080/24704067.2020.1775019>.
- Lago-Peñas C, Lago-Peñas S, Lago I. (2019) Player Migration and Soccer Performance. *Front. Psychol., Movement Science*. 2019, 10. <https://doi.org/10.3389/fpsyg.2019.00616>.
- López-Serrano C., Zakyntinaki M. S., Mon D., Molina-Martin J. J. (2023). Introducing the Technical Individual Contribution Coefficient: A metric for evaluating performance in elite volleyball. *International Journal of Performance Analysis in Sport*, 24(3). DOI:10.1080/24748668.2023.2278380.
- Marquez-Velarde G., Grashow R., Whittington A. J. (2023). The Paradox of Integration: Racial Composition of NFL Positions from 1960 to 2020. *Sociology of Race and Ethnicity*, 9(4). <https://doi.org/10.1177/23326492231182597>.
- Mostaert M, Pion J., Lenoir M., Vansteenkiste P. A (2022) Retrospective Analysis of the National Youth Teams in Volleyball: Were They Always Faster, Taller, and Stronger? *The Journal of Strength and Conditioning Research Publish Ahead of Print*, 36(9). <https://doi.org/DOI:10.1519/JSC.0000000000003847>.
- Metelsk A. (2023). Age of Top European Football Players When They Started Organized Training and Their Value in the Transfer Marke. *Book of Abstracts - the 14th ESEA Conference on Sport Economics*, pp. 86–87.
- Mulazimoglu O., Afyon Y. A. and Girgin S. (2021). The effects of technical and tactical criteria on success in the 2016 FIVB women's volleyball world club championship. *International journal of life science and pharma research*, 11, 200-203.
- Nourai M., Eslahchi C., Baca A. (2023). Arnold Intelligent team formation and player selection: a data-driven approach for football coaches. *Applied Intelligence*, 53(1), 1-16. DOI:10.1007/s10489-023-05150-x.
- Oonk G. (2021). Who May Represent the Country? Football, Citizenship, Migration, and National Identity at the FIFA World Cup? *International Journal of the History of Sport*, 37(11), 1046–1065. <https://doi.org/10.1080/09523367.2020.1844188>.
- Poli R. (2019). Sports Globalization (as Exemplified in Football). *Science in Olympic Sport*, (4), pp. 46–55. https://sportnauka.org.ua/en/wp-content/uploads/nvos/articles/2019.4_7.pdf.
- Pontes V. S., Ribeiro C. H. V., Garcia R. M., Pereira E. G. B. (2018). Migration in Brazilian volleyball: the perspective of high-performance athletes and coaches *Movimento*, 1(24), 187–198. DOI: 10.22456/1982-8918.66495.
- Risser R. E (2020). The Theatre of National Identity in Modern Sport. *Sport Ethics and Philosophy*, 14(3), 377–390. <https://doi.org/10.1080/17511321.2020.1749120>.
- Rocznik R., Stanula A., Maszczyk A., Mostowik A., Kowalczyk M., Fidos-Czuba O., Zajac A. (2016). Physiological, physical, and on-ice performance criteria for selection of elite ice hockey teams. *Biology of sport*, 33 (1), 43-48. <https://doi.org/DOI: 10.5604/20831862.1180175>.
- Rojo J.R., Simiyu W.W.N., Starepravo A.F. (2020). Research on sports migration: an analysis of methodological procedures *Journal of Physical Education and Sport*, 20(2), 546–553. <https://doi.org/DOI:10.7752/jpes.2020.02081/>
- Ruxanda B., Schokkaert J., Swinnen J. (2013). When drains and gains coincide: Migration and international football performance. *Labour Economics*, 21, 1-14.
- Sobol E., Svatyev A., Doroshenko I., Kokareva S., Korzh N., Doroshenko E. (2021). Formation of national teams taking into account the factors of football players' club migration. *Physical Education Theory and Methodology*, 21(4), 389-396. <https://doi.org/DOI: 10.17309/tmfv.2021.4.15>.

- Tainsky S. & Stodolska M. (2010) Population Migration and Team Loyalty in Professional Sports, *Social science quarterly*, 91(13), 801-815. <https://doi.org/DOI:10.1111/j.1540-6237.2010.00720.x>.
- Tavares M. L. R. S., Garcia R. M., Pereira E. G. B. (2019). Brazil's volleyball ranking system and its consequences. *Movimento, Porto Alegre*, 25, 1-14. <https://doi.org/10.22456/1982-8918.87657>.
- Tertuliano I. W., Machado A. A., Oliveira V., Montiel J. M. (2020). Expatriation athletes in soccer and volleyball: the state of the art. *Manual Therapy, Posturology & Rehabilitation Journal*, 22 (2), 31-50. <https://doi.org/DOI:10.5937/EkoPog2002031T>.
- Tsoukos A , Drikos S, Brown L, Sotiropoulos K, Veligeas P, Bogdanis GC. (2019) Upper and Lower Body Power Are Strong Predictors for Selection of Male Junior National Volleyball Team Players. *Journal of Strength and Conditioning Research*, 33(10), 2760-2767. <https://doi.org/DOI:10.1519/JSC.0000000000002472>.
- Tumer A. E & Koçer S. (2017). Prediction of team league's rankings in volleyball by artificial neural network method. *International journal of performance analysis in sport*, 17 (3), 202-211. <https://doi.org/10.1080/24748668.2017.1331570>.
- Xing Wang, Bin Han, Shaoliang Zhang, Liqing Zhang, Calvo LA, and Gomez Miguel-Ángel (2022). The Differences in the Performance Profiles Between Native and Foreign Players in the Chinese Basketball Association. *Front Psychol*, 12, 1-10. <https://doi:10.3389/fpsyg.2021.788498>.
- Van Campenhout G., van Sterkenburg J. & Oonk G (2019). Has the World Cup become more migratory? A comparative history of foreign-born players in national football teams, c. 1930-2018, *Comparative Migration Studies*, 7(1).