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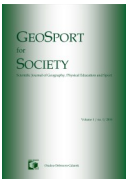

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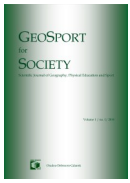

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The journal aims to publish relevant contributions in Geography, Physical Education, Sport Science, Physical Therapy, Economy, Sociology, Psychology, Leisure, Recreation and Tourism, Environment and other areas whose analysis is related to these fields, standing out through originality and scientific contribution to the knowledge and development of this area with benefices for society. An important objective is to promote academic and applied research based on interdisciplinary with a complex local and global approach.

The content of the publication is intended for a heterogeneous community made of teaching staff, researchers, practitioners and students showing interest in that fields, who can contribute substantially to the understanding, promotion and development of places, regions and the territory in its whole.

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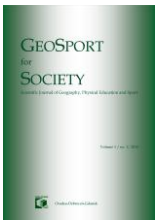

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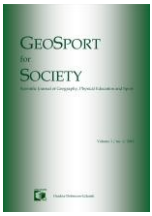

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For Geography and Sport, Sport Geography or Geography of Sport

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Abstract. Sport through its forms of expression and organization, through quantitative and qualitative features of the participants and spectators, through the fact that it is an inseparable part of daily life on Earth, by on-going local, regional, national or international area, requires a geographical analysis, where meet two essential parts: the space and time to which the analysis focused on the links between *sports* and *place*. The literature shows a large number of specialists in interdisciplinary studies on sport, geography, and other scientific fields as economics, medicine, sociology, tourism etc. Through this study we aimed to present a series of conceptual and methodological arguments specific for geography and useful in spatial analysis of sport, all supported by highlighting some representative papers in this interdisciplinary research field direction. All arguments converge to Gaffney's definition that "sport is inherently geographic."

Keywords: Sport Geography, Geography of Sport, Sport and Place, spatial analysis

Sports, through its organization and manifestation forms, through its built specific infrastructure, has become an inseparable part of society in general, the differences being of quantitative and qualitative nature and whose value is generated by the involvement degree of each actor as part of the society (of the whole). The effects of spatial carrying on of sports activities are extremely varied, with wide visibility in the economic, social, cultural or medical domains and which can *be* carried on at local, regional, national or international level. The spatial analysis studies of sports have in many cases a multidisciplinary character by completing and consolidating the scientific endeavor with issues and methods specific to other

domains. A integrated book who present the evolution of sport in various social sciences is edited by Maguire Joseph (2014), the book who promotes development of and through sport written by leading figures: Vamplew W. (History); Loland S. & McNamee M. (Phylosophy); Lavallee D., Kremer J., Moran A. (Psychology); Klein, A. (Anthropology); Maguire J. (Sociology); Gaffney C. (Geography); Rowe D. (Media studies); Szymanski S. (Economics); Grix J. (Political Science); Levermore R. & Beacom A. (International relations); Healey Deborah (Law); Spaaij R. (Social policy); Thibault Lucie (Management) and Penney D. (Education).

By using certain geographic methods and tools of approaching sports, the most popular domain on Earth, the society benefits, on one hand, of extremely useful information regarding the spatial dimension of a sport branch or of sports generally and, on the other hand, of a scientific expertise referring to the support natural and anthropic elements for carrying on sport activities. Under such circumstances, the sport movement, diversified as type and form, generates local, regional or worldwide activities which through the manifestation manner and location produce benefits and development for the human society.

A clear example of activity generated, but also generating benefits for society and related to the sport activity is tourism. For a better understanding of the role of *Geography*, generally, and that of *Geography of tourism* especially, in such a spatial analysis it is emphasized the scientific paper work elaborated by Hall & Page (2008) entitled *Progress in Tourism management: From the geography of tourism to geographies of tourism – A review,* in whose table of contents the authors present the role of geographic research in "explaining spatialities; tourism planning and places; development and its discontents etc...". Starting from a definition of tourism unanimously accepted according to which "any person who travels from home towards one or several places or objectives having as purpose the recreation, rest, knowledge, performing activities other than those performed regularly" (Cocean et al., 2002, 20), we can include into this category all the participants to manifestations with sport character. The sporting events, through spectators and sportives (the dynamic component) generate tourist activity, being assimilated to the tourists or excursionists who, in turn, benefit of a variety of services provided with the occasion of the respective manifestations (Ilieş et al., 2014, 280). The infrastructure (the static component) created form the purpose of carrying on the sport activities, be it temporary or permanent, represents the support element for these events and it can be included, either directly as support element of the manifestation, or indirectly by connecting or integrating it into the infrastructure for tourist activities (hotels, restaurants etc) The international competitions (Olympic, world, continental and regional) are in this respect the most expressive in explaining the spatial analysis of the sportive phenomenon (Bale, 1989; 2003; Gaffney, 2010; 2014; Conner, 2014a; Jackson, 2014).

The complementarity between the two sciences, geography and sport (and with other domains as well, more or less related), results especially from the role of the support-element of the geographic components in carrying on of sport activities. Thus, the prospection and scientific preparation of the territorial support of activities with sportive character, the understanding and causal explanation of their ongoing, providing the systemic functionality of component elements, all for the identification in the end of their impact upon society etc, are based on various working methods and techniques specific to geography (combined in the scientific endeavor with those specific to sports), amongst which the most representative are the cartographic ones. Thus, the theoretical and methodological component facilitates the systemic

understanding of phenomena by joining the cartographic part with the text, through analysis and synthesis, all with causal explanation role of phenomena and processes and of contouring territorial systems (Ianoș, 2000) with a high degree of functionality (Ilieș et al., 2012).

The representative product of geographic analysis is *the map* as it reflects the essence of the geographic study (figure 1). The geographer usually produces two major types of maps: of *public utility* (especially tourist, orientation maps with high degree of accessibility and understanding for non-specialists) and *maps with scientific character*, more complex and usually accessible for specialists. Both types, through the work volume and information presented graphically, represent the icon of geographic endeavor useful for society. Thus the map has gradually become working means of spatial expression of phenomena for other sciences as well, with an important role in providing information for society. However, irrespective of the technological process with various types of software, GIS (Ahlfeldt & Maenning, 2010; Zale & Bandana, 2012), the impression of geography remains through its specific principles and methods used.

Another defining component of geographic analysis is the methodological part based on a system of specific principles and methods, but which is also neighboring with other disciplines, all with the purpose of providing "the methodological orientation and general direction to be followed in the use of knowledge procedures such as the correlation between part and whole, between analysis and synthesis, between spatial analysis and chronological analysis" (Coteț and Nedelcu, 1976, 12).

The principles which guide, the methods and tools which facilitate the geographic analysis or the spatial analysis of a phenomenon or process and which represented the basis of geographic scientific foundation, they can all be extremely useful in the spatial analysis of sports activities under all their structural and manifestation forms. According to specialty literature (Coteț & Nedelcu, 1976; Mac, 2000; 2008; Cocean, 2005; Petrea, 2005; Ielenicz & Comănescu, 2013), the principles most used in geographic studies with applicability in the spatial analysis of sports are: spatial distribution, causality, hierarchy, structuralism, correlation, integration, chronology etc, and as methods and tools, we mention: observation, description, comparison, explanation, analysis and synthesis, modeling and the most representative one, the cartographic method, strongly influenced recently by GIS tool (Ahlfeldt & Maenning, 2010; Zale & Bandana, 2012). During the past years, GIS, through the multitude of applications and the facility to manage and fast transpose a data base into images in cartographic form, makes modeling as work method and the model as graphic or material expression to be extremely used in establishing various causal correlations, in knowing the mechanism by deciphering and understanding each component part, their dynamics and especially in the increase of capacity and accuracy of predicting various phenomena and processes. Everything is accomplished on the background of quantitative and qualitative diversification and amplification of modeling variants of the territorial design according to the structure of the used data base. Finally, such an endeavor becomes very useful in elaborating territorial planning strategies with the purpose of contouring territorial systems with a functionality degree as high as possible. To what has been mentioned above, the regional method is added based on *"the selective and integrated study of geographic phenomena and processes within a given territory…and whose originality comes from the frontal approach of an extremely complicated phenomenology, with the purpose of determining the structure, vectors and function of the system thus contoured. …the concrete result is the functional organization of the territory"* (Cocean, 2005, 138).

However, it has to be mentioned the fact that a complex paper work of *Geography of sports* cannot be based on a single principle. Usually, at the level of scientific endeavor, we identify a sum of principles, methods and tools carefully chosen by the author, so as the obtained results would be the most convincing and useful. In a quick radiography we shall try to present a series of representative paper works in order to prove the usefulness for society of systemic construction between sports and geography.

The role of space and time in the geographic analysis of sports is determined by the specifics of the geographic science. The spatial distribution and temporal sequences of a phenomenon and the contouring of a territorial design according to the features of the analyzed element represent the trail of a classical and complete geographic scientific endeavor. Thus, through geographic analysis, there are reflected quantitative and qualitative aspects of system component elements, of the most representative or dominant ones, all emphasized by sketching up the geographic regional design under the form of the objective, region or area which, in turn, reflect the geographic zoning or non-zoning, all encompassed in the geographic time which is reflected through features such as: *recurrence, succession, flexibility and irreversibility* (Cocean, 2005, 50).

In order to emphasize the evolution of scientific determination between the two domains, *Sport* and *Geography*, Bale & Dejonghe (2008) published in *Belgeo* journal an article entitled *Sport Geography: an overview* (157-166), where they presented a full radiography of representative authors and paper works in the domain geography of sports. For the early stages, there are mentioned the first studies which approached such an issue and they were elaborated by Elisee Reclus (1879) and Hildebrand (1919). In the same editorial there is a series of themes focused on: sport migration; relationship between the location of sports teams in their stadium and neighbourhood and the local identity; impact of sporting events or sport stadiums on a certain area; sport, geography and territorial planning. In another study, *Geography of Sports*, Gaffney (2014, 109) considers that the first geographic study focused on the issue of a sport in the American Literature was Albert Carlson's (1942) treatment of skiing in New England (Bale and Dejonghe, 2008).

A fundamental paper work with clear directions of geographic analysis of sport in all its manifestation forms is the one elaborated in two editions by the most representative and copious specialist in the domain Sport Geography, the British John Bale (1989; 2003), entitled *Sport Geography*. Geographic specificity is obvious both in the title and in the content focused on certain key topics: "space and place; location and landscape; geographic diffusion; globalization; economics; the community; and geographic imaginations"[1]. In 1994, on the same geographic analysis of sport line, Bale elaborated another representative paper work entitled *Landscape of modern sport*. Previous to the two theoretically and methodologically fundamental works, Bale published another article focused on *Sport and place in British space* (1982). *Sport Geography* has as theoretical and practical foundation the link between sport and place (Bale, 1982b), "employed geographic modeling and economic models to predict ideal locations for sport teams and facilities" (Gaffney, 2014, 112). In a theoretical sense of defining *Place*, it is "a portion of territory of a certain size and a certain shape which has a material, energetic and informational content" (Mac, 2000). We notice the importance of spatially defining its features and, implicitly, the applicability of such an endeavor for the impact of sport in all its manifestation and structural forms upon

[1]http://www.oxfordbibliographies.com/view/document/obo-9780199874002/obo-9780199874002-0067.xml

society. The importance and complexity of place are provided by its attributes: absolute or relative localization; extension; geographic content, spatial structure; dynamics in time space, content and functions (Mac, 2000). Additionally, other studies are focused on analyzing the elements which establish the territorial design of the place (Bale, 1998; Hall, 2008), the site (Bale & Vertinsky, 2004; Ilieş & Josan, 2009; Kozma et all., 2014b) or its reflection in the local (Bale & Moen, 1995; Shobe, 2008; Kozma & Suli-Zakar, 2012), regional (Gaffeny, 2008; 2010) or international (Giulianoti & Williams, 1994; Augustin, 1995; 2007; Hallinan & Jackson, 2008; Scherer & Jackson, 2010) cultural space.

Considered by Bale the father of modern Sport Geography, the American geographer John Rooney (1974), examining "regional variations of sport practices and player origins in the United States" (Gaffney, 2014, 110), emphasizes the role of special analysis in the sport domain in his article *A geography of American Sport: From Cabin Creek to Anaheim.* Rooney's role in promoting *Sport Geography* is defining as the American, together with other authors, edited in 1987 the first specialty journal entitled *Sport and Place. An international journal of sports geography,* which appeared regularly until 2000. The role of this publication was to continue "the tradition of choropleth map-based studies also included more humanistic and interpretative papers" (Bale & Dejonghe, 2008, 2).

Infrastructure is defining in contouring the place. Thus, it's spatial analysis and, implicitly, of sporting events, represents a consistent part in the specialty literature. Organizing events at any scale implies human mobility and flow differentiated through volume, distance and direction depending on the event width. The importance of such studies is strongly reflected in the organizing politics of the local, regional, national, continental or international space, endeavors with major impact in society. A study in this direction is the one elaborated by Ahlfeldt & Feddersen (2010, 11) entitled *Geography of sport metropolis*, focused on the role played by the localization of sport infrastructure of Hamburg, Germany from the residents` perspective. Moreover, the spatial analysis is supported by mathematic modeling. In the same trend of defining the place through sport infrastructure elements, Bale (2000) in chapter 7 *The Changing face of Footbal: Stadiums and Communities* develops the idea that "professional footbal clubs represent place large and small-villages, towns, cities and nations" (2000, 91). Bale & Moen (1995) in the book *The stadium and the city* emphasizes the role of the stadium in defining the cultural space of a city. Gaffney (2008; 2010; 2013) and Gaffney & Mascarenhas (2008) through his works focused on the role of stadium and of international events in defining the Brazilian cultural space is on the same analysis direction. Shobe (2008) through *Football and the politics of place: Football Club Barcelona and Catalonia* contributes with a clear example of cultural space defining and of contouring its polarization area through football. Studies focused on international impact of certain sports and events are those elaborated by Giulianotti & Williams (1994), Giulianotti (1999), Tiesler & Coelho eds. (2008), Horne & Manzenreiter (2002; 2006), Giulianotti & Robertson (2007) Cho (2009), Cho et al. (2012), Conner (2014b), Jackson (2014) etc. The social impact reflected through politics and media can be found in Trumpbour's work (2007), who associates stadiums with "new cathedrals". Bale & Gowing (1976) propose use footbal to teach geography, DeChano & Shelley (2006) propose a series of ways "which demonstrates how sports can be used to teach geographic concepts using example from Kansas City" or the same idea for Latin America (Gaffney, 2006).

The spatial analysis of sports plays an important role in the territorial planning and organization politics, aspect promoted by the French geographer Augustin (1995)

in the book *Sport, géographie et aménagement.* In Netherlands as well, most studies focused on the relation between geography and territorial planning have as analysis subject sport arenas. Other preoccupations in the same direction are those concerning urban development and sport infrastructure (Thornley, 2002; Turner & Rosentraub, 2000; Kozma & Suli-Zakar, 2012).

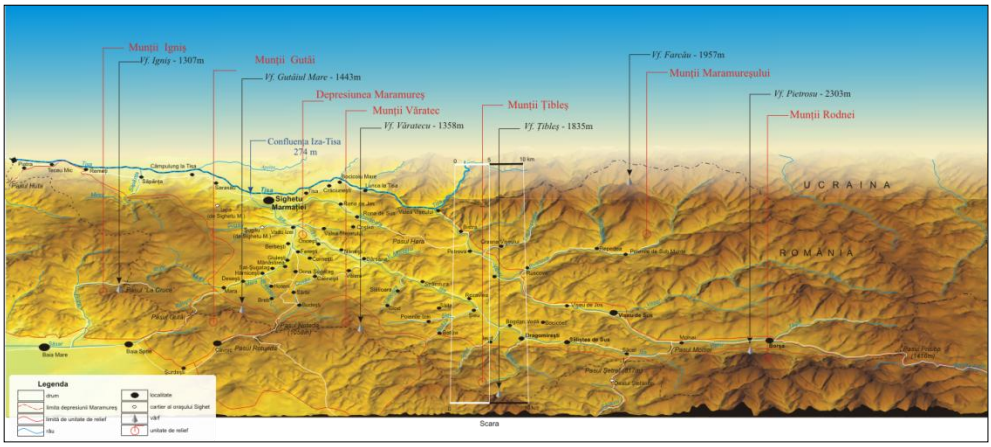

Figure 1. Exemple of 3D map of relief-support for geographical analysis. Maramureș Land (source: Ilieș M. in Ilieș Al. et al., 2014, p. 100)

Figure 2. Environment and Infrastructure for leisure, sport and agreement. Marina of Le Marin (Martinique); (source photo Dehoorne, 2006)

For geography and for sport, tourism is an important connector for the two domains, either through infrastructure as support (static component) for the spatial carrying on of sporting events, or through spectators and sportives (dynamic

component) assimilated to the tourist flow (Wendt, 2011,9). Hall and Page (2008) review the geographic contributions in tourism studies focused on: explaining spatialities; tourism planning and places; development and its discontents; tourism as an 'applied' area of research, and future prospects. The relation between sport geography and spending free time can be encountered in the study edited by Witherick and Warn (2003) or the relation between sport, tourism and development, or between sport, tourism and leisure (Wendt, 2011, 35). In Romania, from the specialty literature and amongst the studies in which the sport activity is reflected directly or indirectly through infrastructure organization are the geographic studies of tourism, out of which we mention those elaborated by: Muntele & Iaţu, 2006; Ciangă & Dezsi, 2007; Ilieș M, (2007); Gozner (2011); Pop (2014); Ilieș and al., (2014) etc.

The interdisciplinary character of geographic analysis can be encountered in the study *Sport and Time geography: A good match?* elaborated by Moore and al. (2003) and proposes "using the rich visual *language*" of Hägerstrand's time geography to represent time-space relationships in sport, in particular within the spatial and temporal constraints of a game of rugby" or in the study entitled *Common Ground? Links Between Sports History, Sports Geography, and Sociology of Sports* elaborated by Maguire (1995). Other studies are focused on spatial analysis of: financial impact upon sport in case of Belgian football (Demause & Cagan, 2008, Dejonghe & Van Opstal, 2010); spatial distributions of sport connected workforce flow (Bale & Maguire, 1994; Dejonghe & Van Opstal, 2009; 2010; Kozma et al., 2014a); organization of sport activities on geographic principles and criteria (Guy, 1997; Dejonghe, 2004; Jackson & Haigh, 2009).

All sport geography studies are based on the *map* which, through specific execution methods and means, reflects the local, regional or international impact of sport. *Maps* "are graphical representations which facilitates the understanding of things, concepts, conditions, processes or phenomena in the human world" (Harley & Woodward, 1987, XVI, cited in Mac, 2008, 142). Such studies are those elaborated by: Mathieu & Praicheux (1987), Rooney & Pillsbury (1992), Bale (1993b), Gozner (2011), Pop (2014; figure 5), Ilieș Al. et all (2014) etc, in which the cartographic representation represents the focal point of the scientific endeavor (figure 4).

Geographic studies of relief and geomorphology (Figure 1 and 2; Widmer, 2011; Voiculescu, 2012; Bâcă & Ștefănescu, 2014), climatology (Chambers et al., 2003; Teodoreanu & Gaceu, 2013), hydrology, human geography, political geography (Darnell, 2012; Ilieș et al, 2012), social geography (Kozma et al., 2014a), territorial planning (Bale, 1993a; Essex & Chalkley, 2004; Hall, 2008; Dehoorne et al., 2010; Wendt, 2011; Ilieș D. et al., 2013 (Figure 3); Bâcă & Ștefănescu, 2014) belong to the category of those which through their results create conditions for the support of carrying on sporting events.

In conclusion, through the richness of elaborated studies and those which could not be included in this material because of space limitation, we can consider sport as part of the existence and manifestation of the contemporary world and which is reflected in society through the highest popularity out of all its manifestation forms. Practiced on the entire planet "sport is inherently geographic" (Gaffney, 2014, 109). The geographic analysis provides the support of carrying on sports under all its manifestation and structural forms, and it also it spatially analyzes its consequences upon environment and society, with the purpose of identifying the most efficient solutions in contouring territorial systems with high degree of functionality.

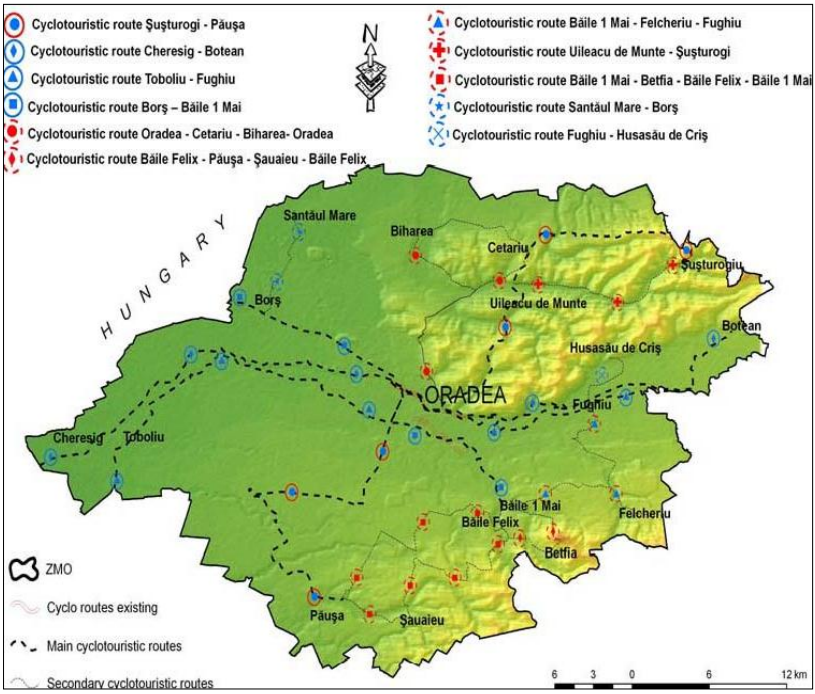

Figure 3. Map of cyclotouristic routes proposed for Oradea metropolitan Area (Ilieş Dorina et al., 2013, 108)

Figure 4. Cartographic distribution of sport activities represented by symbols (balls). Exemple: Fragment of the map: *Crişana-Maramureş. Sport, infrastructure and sport activities* (Ilieş et al., 2014, 284)

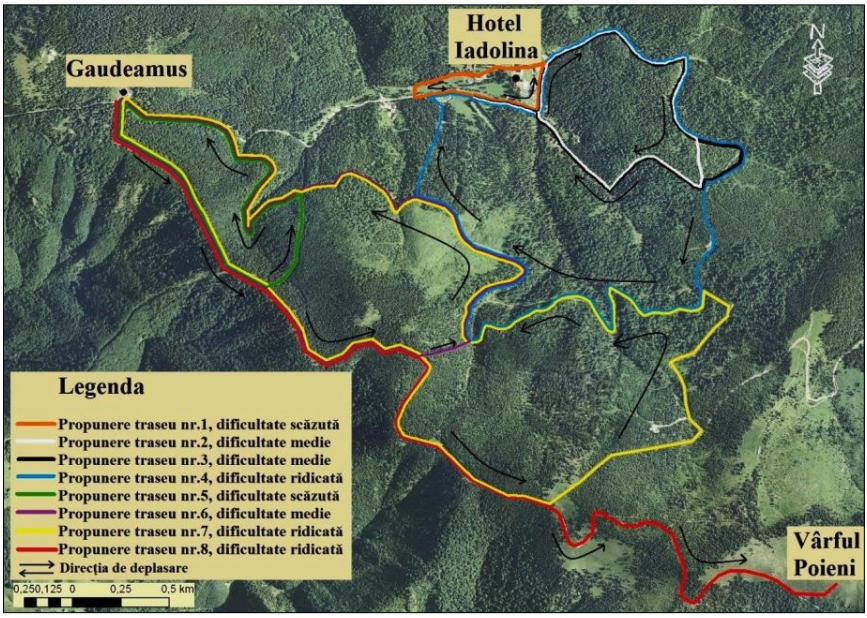

Figure 5. Model of map used in activity of tourist planning in Apuseni Mountains. Ski area (Pop, 2014, 134)

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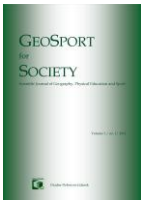

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The spatial development of sports facilities within the cities: a Central European case study

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Abstract. As a result of the increasing significance of sports which can be observed in the recent decade, researchers in the field of the urban geography have also begun to pay more attention to the spatial location and development of sports facilities within the settlements. Using the example of Debrecen, one of the outstanding cities of Hungary from the point of view of sports, in addition to describing the development of the sports facilities, the aim of present paper is to describe the spatial development of sports facilities, to classify them into different categories and to observe the factors influencing their spatial development. As a result it can be said that in the case of the larger sports facilities locations on the edge of the city or in suburbs dominated at the time when the projects were completed, but these facilities may be rather considered today as located within the city boundaries. As far as smaller sports facilities are concerned, a central location is found in a few cases, but the most important characteristic, both at the time when the projects were completed and today, was location within the city. If we consider the factors influencing the location of sports facilities, the most important role, similarly to international trends, was naturally played by the location of the available plots; in addition, accessibility and the proximity of the market of users were also determining factors.

Keywords: sports facilities, location, influencing factors, Debrecen

Introduction

As a result of the increasing significance of sports which can be observed in the recent decade (Ilieș et al., 2014), researchers in the field of the urban geography have also begun to pay more attention to the spatial location and development of sports facilities within the settlements.

According to researchers, three categories can be identified with respect to the location of sports facilities within cities (Thornley, 2002):

-location in the city centre or its close proximity;

-location within the city;

-location on the edge or suburbs.

The *first type* primarily emerged due to historical reasons, since in this case the facility was located on the edge of the settlement being formed in the past; however, due to the growth and spatial expansion of the settlement, the location of the facility can be regarded today as central. On the other hand, from the early 1990s, due to the importance of the renewal of the deteriorated inner city economies, primarily in the United States of America, this option came to the foreground once again (Turner & Rosentraub, 2002; Nelson, 2007, 13). The results of the most detailed survey (Newsome & Comer, 2000) on this topic supply evidence for the change in a very convincing way: by 1997, more than 50% of all sports facilities could be regarded as centrally located, and in two sports (handball, ice hockey) this proportion was even higher.

Suburban or edge of the city locations became very popular in the United States of America in 1960s and 1970s due to several reasons (Bale, 2003, 208; Barghchi et al., 2009). Firstly, due to the difficulties inherent with the expansion/modernisation of existing facilities, an obvious option arising in the 1960s, also in line with the decentralisation of cities, was the construction of facilities on cheap suburban plots, and the economic efficiency was further enhanced by the fact that the property on which the previous facility was located could be sold at very favourable prices. Secondly, these facilities were constructed in areas close to motorways, and thus had excellent accessibility, and it was not a concern either that the spectators would disturb the people living nearby.

Thirdly, these areas at the time had a more positive image than the inner city areas, and this was also an important factor. In addition, there were opportunities in the vicinity of the sports facilities to carry out other developments (e.g. hotels, shopping malls, conference centres), which further enhanced the attractiveness of the given complex (and the availability of shared parking areas was an advantage).

With the exception of Great Britain (Bale, 1994, 240), the suburbanisation of sports facilities (mainly football stadiums) in Europe could be observed for a long time, and from the early 1990s it received fresh impetus due to the following two factors. On the one hand, due to the increasing popularity of football, the existing facilities proved to be small, and in order to increase their revenues, clubs set as an objective the construction of larger facilities. On the other hand, as a consequence of the tragedy that happened in Hillsborough in 1989, increasingly strict requirements were implemented with respect to the technical standards of stadiums. The demands that arose could not be satisfied in most cases in the existing location, and as a result the suburban or edge of the city location emerged, which was further reinforced by the first and second reasons also mentioned in connection with the United States of America.

There may be several factors behind the increasing popularity of locations still *within cities* but at a certain distance from the current city centres (Barghchi et al, 2009). On the one hand, it may be due to the fact that the necessary modernisation/expansion of the facility is not possible on the previous location (see above); at the same time the team, partly in order to keep its base of supporters, does not want to move to a larger distance (cf. the new stadium of Arsenal, constructed in 2006 at a distance of approximately 500 yards from the earlier facility). The above phenomenon was particularly frequent in the 1990s in Great Britain where, according to the Taylor report issued after the Hillsborough tragedy, only seated spectators could be allowed in the stadiums of teams in the Premier and the Championship Leagues.

On the other hand, in case of newly constructed, larger sports facilities (e.g. developments related to the Olympic Games), there is more emphasis on locations within the city that are easily accessible by way of public transportation. In both cases, facilities are frequently built on previously industrial, currently deteriorated neighbourhoods in the hope that the new facility will play a leading role in the renewal of the given part of the settlement.

Using the example of Debrecen, one of the outstanding cities of Hungary from the point of view of sports, in addition to describing the development of the sports facilities, the present paper attempts to find answers to the following questions:

-In which categories can be classified the sports facilities built in Debrecen?

-What factors influence the location of sports facilities within the city?

In the context of this paper, a sports facility will be understood as a facility that, in the given period, either played an important role in the competitive sports scene of the city, making it possible for the local sports clubs to join regional and (especially after the 1960s) national championships, or provided a venue for the practice of several branches of sports.

The spatial development of sports facilities in Debrecen

We can identify three larger waves in the development of sports facilities in Debrecen. *The first period was before World War II*, when efforts were first made to build facilities satisfying the demands of athletes in the newly formed sports clubs for venues of training and competition. The need for the construction of sports facilities allowing people to exercise in an organized manner first emerged in the Reformed College, the oldest institute of higher education in Debrecen, and in the light of the above it is hardly surprising that the first gymnasium of the settlement (Fésüs, 1997, 459) was opened on the campus of the college in 1873 (Figure 1).

The first sports club of the town, the Debrecen Athletic Club (DTE), established in 1867, welcomed those pursuing gymnastics, athletics and fencing, to which activities bicycling and football were added in the first decade of the 20th century. The facilities of the sports club were concentrated in the northern part of the town: the gymnasium of DTE was opened in 1896 in Bem Square (the northern end of Péterfia Street – Figure 1), while in 1902 the first real sports complex of the town was dedicated in Great Forest (Figure 1), making it possible to pursue several branches of sports at a high level (the facility consisted of the following units: a ball playing field of 100x50 metres, a bicycling track, two tennis courts, as well as shot putting and discus throwing areas).

An important event in the economic development of Debrecen was the foundation of the Railway Wagon Factory in 1890. From the very beginning, the factory devoted a much attention to assisting the work of the cultural associations (e.g. choral societies) promoting the links between railway workers, as well as the sports clubs growing out of the latter. As a natural development, "Egyetértés" (Concord) Football Club was founded as early as 1902 (the club only adopted a much more widely known DVSC name in 1912), and in 1911 the management designated a plot within the area of the industrial plant for the construction of a football pitch (Fig. 1). The development of the area, however, did not happen at the time due to World War I, and the final opening of the complex was only in 1922 (Filep, 1988, 243), when next to the cinder-track, the changing rooms and covered wooden stalls were also erected. (Further developments took place before World War II, including the sowing

of grass on the football pitch, as well as the construction of the bowling and sports halls).

Figure 1 Location of most important sports facilities in Debrecen at the end of 1930s
1 – Gymnasium of Reformed College, 2 – Gymnasium of DTE, 3 – Sports complex of DTE (nowadays Great Forest sports complex: football stadium, sports hall, István Gyulai Athletic Stadium and Training Centre), 4 – Sports complex of DVSC, 5 – Football pitch in Böszörményi street, 6 – Sports complex of DEAC, 7 – Great Forest Stadium, 8 – Indoor swimming pool in Great Forest, 9 – Additional facilities of sport city in Great Forest

An important motivating factor in the development of sports facilities in Debrecen was the demands of the students of the University of Debrecen, founded in 1912. The location of the university was fundamentally influenced by the fact that the city offered 80 and then an additional 35 holds[1] of land in Great Forest, on which it was gradually built up in the 1910s and 1920s. In the light of the above it is not surprising that the sports complex of DEAC (Debrecen University Athletic Club), founded in 1919, was also located in this area, close to the buildings (Figure 1): the facility opened in 1928 consisted of a grass-covered football pitch and tennis courts (Fésüs, 1983, 83).

In the era between the two world wars, the largest sports-related development took place in the 1930s in the Great Forest area of the city (Figure 1). In this period, the city leaders paid much attention to expanding the entertainment opportunities in

[1] 1 hold = 0.57 hectares, or 1.42 English acres.

this part of the city, and the development of sports facilities was a part of this (in the various documents the expression sports park and sports city can be frequently read (Sajó, 1934). The initial plans drawn up were rather ambitious: it included the Great Forest Stadium, the rowing pond, which could be used as a skating rink in the winter, the water park also featuring an indoor swimming pool, sledding and ski slopes, tennis courts, infrastructure for fencing and boxing (from among these, eventually only the first three investments, as well as the sledding and skiing slopes were realized, and the latter two were destroyed during World War II).

In the period between World War II and the 1960s there were no major developments in the field of sports facilities, which is basically due to two reasons. On the one hand, as a result of the developments between the two worlds wars, the existing facilities were fundamentally capable of satisfying the demands arising (the only problem was the lack of an indoor swimming pool). On the other hand, the resources available at the time were primarily devoted to economic development and the improvement of the infrastructure directly serving the needs of the population, which means that there was no money left for sports-related projects.

Smaller-scale developments were concentrated in three areas. First, minor renovations were made in the two most important sports facilities, the Great Forest Stadium and the DVSC complex. Secondly, the right of operation of the Great Forest sports complex and the adjacent shooting range, which were used by DTE before World War II, was obtained by various companies in Debrecen, which created sports facilities (e.g. football and handball pitches, as well as smaller stands for spectators) primarily for use by their own workers. Thirdly in the period after World War II, there was an increase in the popularity of several branches of sports that had been less known before (in Debrecen especially handball), and as a result, some new, basically smaller and lower-cost, open facilities were built in the city centre (in 1970s these sports facilities were gradually liquidated).

Given the above history it should not come as a surprise that by the end of the 1960s, Debrecen faced serious problems concerning the availability of sports facilities, which is shown by the fact that the condition of 30% of the facilities was hardly around 50%, and only 10% were in a 90% condition. The report prepared in the early 1970s by the Presidency of the Debrecen Municipal Council of the Hungarian Athletic and Sports Association correctly identified the shortcomings: "The availability of sports facilities is insufficient in the face of the development of the sports movements in the city and the demands arising. It is a basic problem that in the course of the 3rd five-year plan, the city of Debrecen fell behind similar large cities of the country as far as sports-related developments are concerned." (MTS, 1971, p. 15.).

In order to overcome these problems, the report formulated very ambitious plans in its Medium Term Sports Development Plan drawn up for the period between 1971 and 1975.

"-A modern City Sports Hall, accommodating a large number of spectators, must be built.

-In the interest of providing for the supply of young athletic talents, two training gymnasia must be erected.

-For the purpose of developing sports by school children, the central sports complex for pupils must be constructed.

-In order to satisfy the demand for a place to swim and to develop swimming sports, an indoor swimming pool must be built.

-The Great Forest Stadium, as well as the DVSC and Great Forest sports complexes must be modernized.

-In order to create opportunities for pursuing winter sports, the construction of a skating rink should be urged."

The *second big wave* of the construction of sports facilities in Debrecen took place *between the late 1960s and the mid-1980s*, which was primarily due to the fact that in this period there were larger financial resources available for this purpose, and the expectations of the population and the sports associations were also higher.

First, it was toward the end of the 1960s that the sports complex of No. 6 Auto Transport Company was created in the southern part of the city (Figure 2), which became a major centre of motorcycle speedway, a sport pursued in the framework of Hajdú Volán Transportation Company. Second, with the involvement of significant volunteer work, the Mikes Kelemen Street (Figure 2) handball stadium of the club Debreceni Dózsa was built in 1968 (Csubák et al., 1985, 78), which served as a centre of men's handball sports life for approximately ten years, and due to the outstanding interest by the public it had to be expanded several times.

Third, in the interest of further improving the sports life of the city, three sports clubs of Debrecen merged in 1973, and the new club (DMTE – Debreceni Munkás Testedző Egyesület, i.e. Debrecen Workers' Athletic Club) set the aim of creating a modern Great Forest sports complex on the Oláh Gábor Street area earlier used by them (Figure 2). According to the plans, the new complex was to include a football stadium with a seating capacity of 15 to 20 thousand, also suitable for evening games, as well as an indoor sports hall, a sports swimming pool, a ice skating rank, a bowling hall, as well as a range of small fields suitable for the purpose of mass sports (Gyarmati & Serflek, 1977, 240). Thanks to the financial strength of the sponsoring companies and the support of the city council, the majority of the plans were realized. In the course of 1975/75, the main building including the hotel and the offices was completed, then in 1977 the ice skating rank, in 1981 the athletic stadium, and in 1982 the sports hall also including the bowling area was constructed (with respect to the football stadium, only the new changing rooms and stands were built, and the original plans were not fully implemented).

Fourth, similarly to other major cities in Hungary, in the mid-1970s, in the August of 1976, the first real, larger capacity sports hall (Hódos Imre City Sports Hall) was built on Kassai (then called Szabadság) Street (Figure 2). As a last step of these large-scale developments, the Youth Sports Complex (Figure 2), located in the western part of the city, was opened in 1979, which included a total of 12 fields (e.g. football pitch, handball and tennis courts).

The mid-1980s and the early 1990s once again meant a halt in the development of sports facilities in the city, which can be traced back to the reasons discussed in connection with the 1950s and 1960s. On the one hand, in the last days of socialism and in the first decade of the political changes, the scarce financial resources of both the local governments and of companies did not allow that major sports-related developments be implemented. On the other hand the existing facilities were fundamentally suitable for satisfying the needs of the sports clubs in Debrecen (e.g. the sports halls served as the location of international matches of the women's handball team, including several cup finals as well).

The inadequate quality of some of the existing facilities (e.g. football stadiums, outdoor skating rank) as well as the missing facilities (e.g. the indoor swimming pool, which was already included in the plans in 1961) made large-scale developments imperative from the second half of the 1990s. The need for such developments was

also recognized by the local government, and in the Debrecen regional tourism development plan adopted in 1997, in harmony with the development plan of the Nagyerdő area prepared in 1996, already included some fairly ambitious concepts. Among other things, the documents called for the construction, in the Great Forest (Oláh Gábor street) sports complex, of the indoor swimming pool, the development of the football stadium, the comprehensive renovation of the athletic track, the expansion of the existing hotel, the entire reconstruction of the Great Forest Stadium, as well as the covering of the tennis courts in the DEAC complex. The necessity for the developments called for in the plan was further underlined by the fact that in the new millennium the local government regarded sports, in addition to high added-value industries and cultural tourism, as the third break-out point of Debrecen.

Figure 2. Location of most important sports facilities and sport related objects in Debrecen in 2014
1, 3-4, 6-8 – see Figure 1, 9 – Mikes Kelemen street handball stadium, 10 – Hódos Imre City Sports Hall, 11 – Hajdú Volán speedway stadium, 12 - Youth Sports Complex (nowadays Industrial Park), 13 – Főnix Hall, 14 – Debrecen Ice Hall, 15 – Debrecen Indoor Sports Swimming Pool, 16 – Debrecen Football Academy, 17 – New ice hall

In the spirit of the above it is not surprising that in *the new millennium*, some large-scale developments were implemented (Figure 2), mainly in connection with major international sports events. It was in the framework of the 2nd IAAF World Youth Championships in Athletics that the Oláh Gábor street athletic stadium was

renovated in 2001/2002 (8-lane recortan track, new service building), which won the title of IAAF International Training Centre in 2003, and then in 2006 was named István Gyulai Athletic Stadium and Training Centre. The second largest events hall of the country, Főnix Hall, was constructed in 2002 in just 8 months, after the successful bid of the city to stage the 36th World Gymnastics Championships.

The IIHF World U18 Championship Division II was the event to which the erection of the Debrecen Ice Hall in 2004 can be linked (it served as the training venue for teams warming up for the matches), and in order to meet the growing needs in 2014 a new ice hall was constructed next to the old one. The next large-scale investment in the field of sports took place in 2006-2007, when the Debrecen Indoor Sports Swimming Pool was constructed after the city won the right to organize the 11th LEN Short Course Swimming European Championships.

The most recent major investment projects of the new millennium were predominantly related to football. On the one hand, in 2013, the Debrecen Football Academy was completed in one of the suburbs of Debrecen. The football fields of this complex primarily serve the objective of training the next generations of footballers. On the other hand, in May 2014, the new Nagyerdei Stadium was opened on the location of the old facility. It is ranked as a Category 4 stadium by FIFA and, as such, it is capable of hosting Champions League matches.

Factors influencing the location of sport facilities

By way of summarizing the findings described so far, we can conclude that the most important factor influencing the location of sports facilities within the city was, naturally, the location of vacant plots.

The second most important factor was the good accessibility of the given location. In terms of examining the location of the facilities we can conclude that the majority of them were easily accessible by way of means of public transportation which meant trams before World War I and city buses from the 1960s on.

The third important factor in case of facilities linked to certain companies and educational institutions was the proximity of the given company/institution. The first gymnasium of the city was established in the institution of the most important users, the Reformed College; the DVSC sports complex on Diószegi Street was built within the area of the former Railway Wagon Factory, and this influence can also be identified in case of the DEAC complex (the proximity of the university). The last important factor was the intention to take advantage of possible points of connections, which can be seen in case of developments after the political transformations: in case of the Főnix Hall, the proximity of Hódos Imre City Sports Hall was important (the latter has served as a warm-up venue in case of several sports events), the Debrecen Indoors Sports Swimming Pool was also very consciously built in the "sports district" of the city that had already been established by that time and the new ice hall finished in 2014 was constructed next to the existing one as well.

Conclusions

The most important conclusions of study can be summarized as follows. In the case of the larger sports facilities built in Debrecen, locations on the edge of the city or in suburbs dominated at the time when the projects were completed (Table 1), but these facilities may be rather considered today as located within the city boundaries (Table 2). As far as smaller sports facilities are concerned, a central location is found

in a few cases, but the most important characteristic, both at the time when the projects were completed and today, was location within the city.

If we consider the factors influencing the location of sports facilities, the most important role, similarly to international trends, was naturally played by the location of the available plots; in addition, accessibility and the proximity of the market of users were also determining factors. At the same time, a special feature in Debrecen was also the idea of establishing a sports complex providing a diversity of opportunities, which notion only appeared in most other cities around the world in the 1960s, but was already surfacing as the concept of the "sports city" in the 1930s.

Table 1. The location of sports facilities in Debrecen in the time of construction (number of sports facilities)

		before the World War II	Mid-1940s to late 1980s	Late-1980s to 2014
larger sports facilities	A	0	0	0
	B	0	1	0
	C	4	2	1
smaller sports facilities	A	1	1	0
	B	1	4	4
	C	1	0	0

A – city centre, B – within the city, C – edge of the city/suburb
Source: own research

Table 2. The location of sports facilities in Debrecen in 2014

	larger sports facilities	smaller sports facilities
city centre	0	1
within the city	5	7
edge of the city/suburb	2	0

Source: own research

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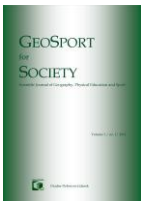

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Studying the implementation of mechanical vibration in sportsmentraining

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Abstract. The vibration is the periodic or oscillatory motion of a body or particles of an environment, executed around a position of equilibrium. The vibration of the whole human body (WBV - Whole Body Vibration) represents the exposure of the whole body ensemble to vibrations, the opposite of local vibrations where an isolated muscle or muscle group is stimulated by using a vibrating device. There are numerous specialized studies supporting the utility of mechanical vibration during training and recovery of athletes. Since the mid 90's, mechanical vibrations were used more and more frequently in sports training. In this study we wanted to highlight the impact of general mechanical vibrations-WBV generated by a vibrating bed, on the sportsmen prior to conventional training. In this study, four players, members of the Oradea University FC football team, who participated in official games and competitions, were evaluated. The stance of the subjects who took part in the study was sitting on the vibrating bed with upper limbs on the thighs, inferior members extended and support at spine level in a fixed support. In order to assess the athletes part of the study, we took into account base values, prior to study initiation date and the final values, after 8 weeks of applying the mechanical vibrations, of the following objective parameters: standing long jump; standing high jump; thigh circumference. The benefit of mechanical vibrationsin athlete training is an area that still requires more specialized research to highlight as accurately as possible the manner in which they can be used to improve the athletic performance. The results of this study confirm that under the influence of mechanical vibrations more muscle fibers, motor unitsare activated, respectively, as compared to simple muscle contractions.

Keywords: mechanical vibration, muscle, footbal players, Oradea University FC team

Introduction

The vibratory motion of a mechanical system is defined as its spatially limited displacement, during which the geometrical and kinetic parameters, which determine the positions of the system elements, are alternately changing the direction of variation, in time between well-established values (Ursu-Ficher, 1984; Paleu, 2008).

Numerous specialized studies (Cardinale & Bosco, 2003; Boboc, 2006; Lamont et al., 2010), conducted mainly in the last 20 years, advocate the use of mechanical vibrations in the preparation and recovery of athletes, due to definite benefits resulting from these of this preparation method. The vibratory movements can be classified in several ways (Ionescu, 2008), depending on the cause that produces vibration, the resistance forces, excitation, their analytical representation or their mode of action on the human body.

According to the way vibrations act on the human body, there are 2 types of vibrations:

-that act on the entire human body, namely the global vibrations, whole body vibration- WBV;

-that act only on the human body segments, namely local vibrations, for instanceon the hand-arm system.

Whole body vibration- WBV is realizedby using a vibrating platform or a vibrating bed; the intensity and the direction of vibration generated by the device are essential in terms of the desired effect. The therapeutic benefit of performing WBV at the elderly was demonstrated and supported in the literature (Rubin et al., 2004; Bautmans et al., 2005). In this study, we wanted to emphasize the impact of general mechanical vibration-WBV, generated by a vibrating bed, on athletes prior to carrying out of conventional training.

Thus the specialized research (Boboc & Căpăţână, 2006), has proven that mechanical vibrations can lead to the recruitment of approximately 95%-97% of all muscle fibers on which they act. Comparatively,during a conventional training the amount of muscle fibers recruited is only around 40%-60%. The positive effects of applyingthe vibration training were recorded also in what concerns the improvement of joint flexibility at anatomical areas subject to vibration level. In the case of athletes performing vibration training, the following were also emphasized:

-improvement of local superficial circulation and at muscle vibration application level (Lohman et al., 2007);

-an incrementof the somatotropin secretion, the growth hormone being a very important element in tissue repair (Marin & Rhea, 2010);

-an increase of the testosterone and endorphins, which relieve pain and consecutively improve athlete's mood (Pâncotan, 2012).

Another benefit of using mechanical vibrationson athletes is that they reduce the mechanical pressure on joints (Pâncotan, 2012), ligaments and tendons; because of this aspect the vibrational training is beneficial in preventing injuries but also during athletes' recovery and rehabilitation phase (Marin & Rhea, 2010).

Materials and methods

The working method used in this study, namely evaluation of physical parameters before and after training with mechanical vibration to a group of athletes, follows the research methodology known in the art (Ronnestad, 2004; Rehn et al., 2007).

Four players, members of the FC University Oradea football team, who participated in official matches and competitionswere evaluated in this study. They performed regular weekly physical activities comprising minimum 8 hours of training and circa 90 minutes official match. The subjects of study were males ofclose age, weight and height. Thus, theywere between 20 and 23 years, weighing about 75 +\- 10 kg. and of anapproximately 175 +\- 10 cm height, the exact details are found in the factsheet of each candidate. All subjects included in the study expressed written

consent to participate in the study. Initially,there were eight players recruited but two of them dropped for subjectivereasons; theydid not want to perform the vibration therapy anymore while the other two have given up for objective reasons: they were injured during the study.

The exclusion criteria of the applying vibrations to athletes study were:

-presence of an accute inflammatory process irrespective of its location;

-any type of comorbidities or neoplasms;

-mental illness;

-subject under treatment with antibiotics or under psychotropic medication;

-presence of metal parts in the body;

-occurrence of adverse reactions of any intensity or nature;

-inavailability to perform physical activities;

The stance of the subjects taking part in the study was sitting on the bed with upper limbs on their thighs and inferior limbs extended to provide support for the spine in a fixed support. The main components of the complex generating mechanical vibrations system used in our study were:

-the vibrating bed;

-the vibration generating electric engine attached to the bed, with a maximum power of 1.5 kW;

-2-patchlike triaxial accelerometers vibration sensors for measuring vibrations generated by the vibrating assembly: accelerometer sat directly on the bed and on the anterior face of the thigh.

The mechanical vibrations were applied three-directionally: vertical- X axis, horizontal-Y axis and axial–Z axis, in a room benefiting from appropriate thermal comfort, over a period of 8 weeks, with a variable frequency according to each subject.

A very important aspect, to be mentioned and respected in practice, is that according to the characteristic parameters, the WBV action may constitute a risk factor on the body athletes (Platon & Niculescu, 2007). Vibrations acting on a human body can produce the disturbance of physical and intellectual activity, and mechanical impairments and or subjective phenomena (Picu, 2010). Because of these issues we have established a study protocol, similar to those in other papers that discussed this topic.

Each mechanical vibration training session was performed with a frequency of 40 Hz and lasted for 13 minutes, a 60 seconds session being repeated 7 times. There was a 60 seconds break between sessions, during which the subjects remained in the stance during the study.

Table 1. Parameters (displacement, velocity, vibration acceleration) of vibration summarized according to the 2 vibration sensors used

	Vertically (X)			Horizontally (Y)			Pivotally (Y)		
	Acc [g-RMS]	Velocity [mm/s-RMS]	Movement [ym-P-P]	Acc [g-RMS]	Velocity [mm/s-RMS]	Movement [ym-P-P]	Acc [g-RMS]	Velocity [mm/s-RMS]	Movement [ym-P-P]
1	0.17	11	240	0.2	14	310	0.06	4	88
2	*0.06*	*3.7*	*150*	*0.05*	*7*	*200*	*0.02*	*1.6*	*56*

1.-exact values of vibration parameters: movement, velocity, acceleration measured by the accelerometer on the bed;

2.-exact values of the vibration parameters: movement, velocity, acceleration measured by the accelerometer on the anterior face of the thigh;

In the table 1 the exact values of the three parameters of vibration are summarized: displacement, velocity, vibration acceleration according to the 2 vibration sensors used.

The meaning and values of other data listed in the table are thus: 1g = gravitational acceleration = 9.81 m/s^2, RMS - vibration media, Peak to Peak (P-P) - peak to peak vibration = 2xP = 2x1.414 RMS, Peak (P) = 1.414 RMS.

In order to assess the players taking part in the study, we took into account the base values, prior to study initiation date and the final values, after 8 weeks of applyingthe mechanical vibrations of the following objective parameters:

-standing long jump;

-standing high jump;

-thigh circumference.

The material used for the standing long jump isthe roulette fixed on the outer edge of the line of departure; the athlete performs a knee flexion then jumps horizontally, legs in a parallel position, as far as possible. The jump is measured in centimeters from the outer edge of the line of departure to the point at the rear of the place where the legs of the athlete have landed. The standing vertical jump, with the reaching of the apex with two hands, comprises the following steps: arms impulse, knee flexion, standing vertical jump and reaching as high as possible with both hands. The material used is the graded roulette fixed on a vertical wall; the jump is measured in centimeters from ground level to the lowest point of fingers' place of contact on the vertical wall.

The circumference of the thigh was determinedby using the measuring tape positioned horizontally, just below the buttocks, the last gluteal fold. The measuring (in centimeteres) is done as the athlete is standing in an orthostatic position, with the legs slightly apart and body weight equally distributed on both feet.

Futhermore, for an interpretation as accurate as possible of the values of this parameter the skinfold was also measured before and after the vibration training. The measuring of the thickness of the cutaneous plica was done was performed by using the adipocentimeter for the 1/3 average of the anterior face of the thigh, on the anterior midline. The lower limb under examination was relaxed, leaning lightly on the top of the foot; so that the entire body weight was distributed on the collateral inferior limb.

During the study, the participants must comply with the following rules:

-before applying the vibrations: they must not eat for 2 hours, not drink for 30 minutes and not perform exercise;

-when applying the vibrations: they do not perform any kind of physical or intellectual activity;

-following the vibration training, within 30 minutes, the subjects perform a specific physical training.

Results and discussion

The results of the monitored parameters before and after concluding the research and the factsheets of the four subjects part of the study were as follows:

Athlete number 1:

-factsheet: age-20; size-174 cm.; weight: 72 kg -before the study, 72.7 kg,- after study; skinfold thickness: 13.1 mm -before the study, 13.1 mm -after study; training frequency: 6 sessions\week, a total of 48 meetings with a pause on Sunday;

-objective parameters, mentioned below:

Studied parameters	Initial values -before the survey	Final values -after the survey
long jump	238 cm	246 cm
high jump	55 cm	62 cm
left thigh circumference: relaxation-contraction	57-57,7 cm	58-59 cm
right thigh circumference: relaxation-contraction	57,3-57,8 cm	58,1-59 cm

Athlete number 2:

-factsheet: age-21; size-177 cm; weight: 78 kg -before the study, 77.8 kg -after study; skinfold thickness: 14.3 mm -before the study, 14.2 mm -after study; training frequency: 5 sessions\week, total 40 sessions with pause during weekends;

-objective parameters, mentioned below:

Studied parameters	Initial values -before the survey	Final values -after the survey
long jump	236 cm	243 cm
high jump	43 cm	30 cm
left thigh circumference: relaxation-contraction	59,5-60,4 cm	61,1-62 cm
right thigh circumference: relaxation-contraction	59,6-60,4 cm	61,5-62,2 cm

Athlete number 3:

-factsheet: age-23; size-184 cm; weight: 83 kg -before the study, 84 kg -after study; skinfold thickness: 14.8 mm -before the study, 14.9 mm -after study; training frequency: training every second day - a total of 28 sessions;

-objective parameters, mentioned below:

Studied parameters	Initial values -before the survey	Final values -after the survey
long jump	238 cm	241 cm
high jump	50 cm	52 cm
left thigh circumference: relaxation-contraction	56-56,7 cm	56,4-58,1 cm
right thigh circumference: relaxation-contraction	57-58 cm	57,3-58,2 cm

Athlete number 4:

-factsheet: age-22; size-180 cm; weight: 82 kg -before the study, 82.4 kg -after study; skinfold thickness: 14.7 mm -before the study, 14.7 mm -after study; training frequency: 2 trainings\week, a total of 16 sessions;

-objective parameters, mentioned below:

Studied parameters	Initial values -before the survey	Final values -after the survey
long jump	222 cm	223 cm
high jump	44 cm	44 cm
left thigh circumference: relaxation-contraction	62,1-63,2 cm	62,2-63,5 cm
right thigh circumference: relaxation-contraction	61,5-63,1 cm	61,5-63,3 cm

By analyzing the factsheets of the 4 subjects who took part in the study, it was noticed that the number of mechanical vibration trainings did not significantly affect the evolution of the body weight of the subjects or the skinfold thickness. Pratically, with regard to the body weight, the most significant development occurred was in teh case of the subject who performed 28 training sessions, from 83 kg to 84 kg, a weight increase of 1.2%, respectively.

The skinfold thickness of only 2 subjects was influenced by the mechanical vibration training:

-the subject who completed 40 sessions from 14.3 mm to 14.2 mm, a 0.7% decrease of the skinfold thickness;

-the subject who performed 28 sessions from 14.8 mm to 14.9 mm, a 0.67% increase of the skinfold thickness;

Analysis of the comparative evolution, before and after the study, of the results obtained, for the long jump, shows that the training sessions number has direct impact on the achieved performance. Thus, one can notice in the data listed in the table below, that the performance increase percentage decreases from 3.36%, for the subject who performed 48 sessions, to only 0.45% in the case ofthe subject who performed 16 meetings. Upon comparingthe 4 results reflecting the benefit of the researchand highlighted in the table below (table 2), one has learned that there is a significant difference between the success of athletes performing 48-40 training sessions and those performing 28 to 16 training sessions ($p < 0.001$).

Table 2. The comparative evolution of the results in long jump depending on the number of meetings conducted

Number of performed sessions	Long jump (cm)		% increase
	Initial	Final	
48 sessions	238	246	+3,36%
40 sessions	236	243	+2,97%
28 sessions	238	241	+1,20%
16 sessions	222	223	+0,45%

Comparative graphical representation of the 4 growth percentageregarding the lenght of the long jump, obtained after having carried out the study in question is presented in figure 1.

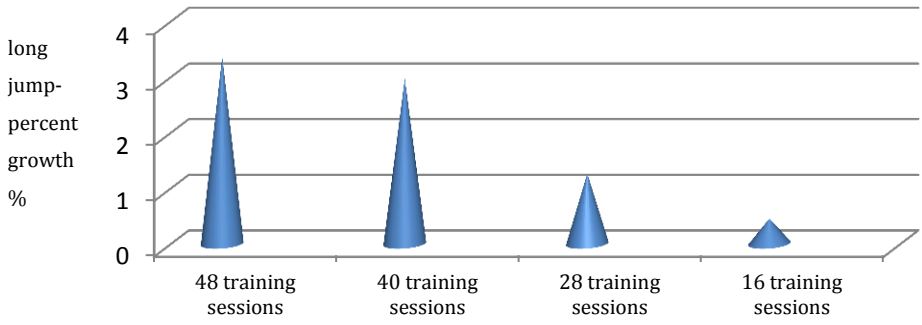

Figure 1. Graphical representation of the 4 growth percentage regarding the lenght of the long jump, obtained after having carried out the study in question.

The number of training sessions has a direct impact on the performance of the high jump, on the growth rate of results obtained after having carried out the study, being directly proportional to the number of repetitions. The comparative analysis of the initial and the final results, summarized in the table below, for the subject having attended 48 sessions show an improvement of the performance from 55 cm to 62 cm.

The growth rate of the obtained results (table 3), compared to the training sessions frequency, is the highest for the subject who performed 40 repetitions, while in the case of the athlete who attended only 16 sessions no improvement of the initial performance was noticed

Table 3. The comparative evolution of the results in high jump depending on the number of meetings conducted

Number of performed sessions	High jump (cm)		% increase
	Initial	Final	
48 sessions	55	62	+12,73%
40 sessions	43	50	+16,28%
28 sessions	50	52	+4,0%
16 sessions	44	44	0,0%

The graphical representation of the evolution of high jump for the 4 subjects that took part in the study (figure 2), namely the length of the high jump, after the completion of the study as compared to that measured before its carrying out is shown below.

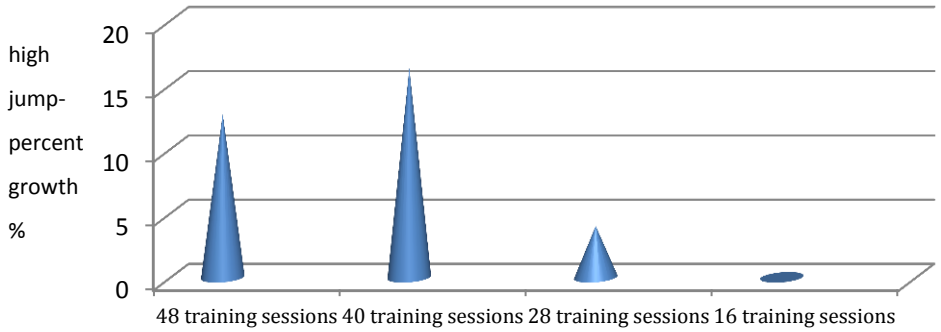

Figure 2. Graphical representation of the 4 growth percentage regarding the lenght of the high jump, obtained after having carried out the study in question

Table 4. The values of the thighs circumference before and after the study

	Left thigh			Right thigh		
	Initial-cm	Final-cm	% increase	Initial-cm	Final-cm	% increase
Relaxation						
48 sessions	59,5	61,1	2,69	59,6	61,5	3,19
40 sessions	57,0	58,0	1,75	57,3	58,1	1,40
28 sessions	56,0	56,4	0,71	57,0	57,3	0,53
16 sessions	62,1	62,2	0,16	61,5	61,5	0,00
Contraction						
48 sessions	60,4	62,0	2,65	60,4	62,2	2,98
40 sessions	57,7	59,0	2,25	57,8	59,0	2,08
28 sessions	56,7	58,1	2,47	58,0	58,2	0,34
16 sessions	63,2	63,5	0,47	63,1	63,3	0,32

By analyzing the table below (table 4), which includes the initial and final values of the circumference of both thighs, both in relaxation and contraction state, it was noticed that the greatest benefit was recorded in the case of the athlete having performed 48 training sessions. Compared to this topic, the development of the thigh circumference, in relaxation and contraction state, of the athlete who carried out 40 repetitions was slightly lower ($p > 0.05$). Alternatively, compared to the same topic, the development of thigh circumference in the case of the athlete having taken part in 16 training sessions, was significantly lower ($p < 0.001$).

Identically, in the case of the athlete having participated in 28 sessions: the thigh circumference development was significantly lower ($p < 0.001$) except the circumference of the left thigh in contraction state, where an increase from 56.7 cm to 58.1 cm ($p=0.807$) was noticed.

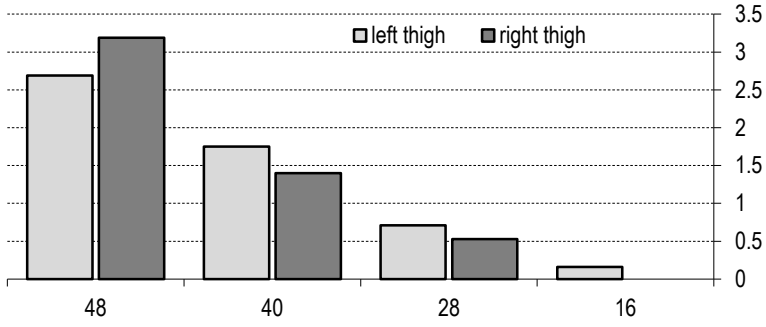

Figure 3. The evolution of the circumference of the relaxed thigh circumferenceof the 4 subjects who participatedin the study.

The graphical representation of the evolution of the circumference of the relaxed thigh circumferenceof the 4 subjects who participatedin the studyis presented in figure 3. The right column represents the the evolution of the thigh circumference growth percentage subsequentto the performing of the mechanical vibration therapy while horizontally the number of training sessions each subject performes is stated.

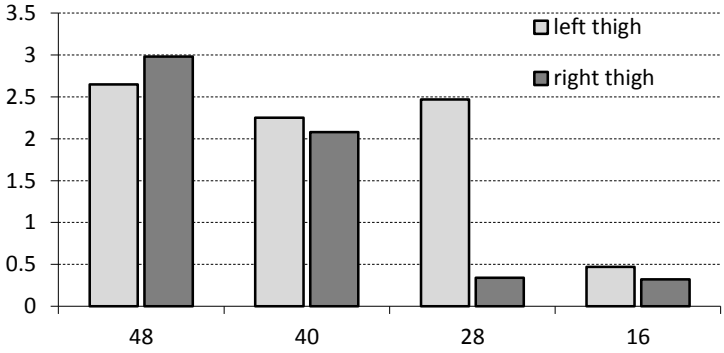

Figure 4. The evolution of the circumference of the contracted thigh circumference of the 4 subjects who participated in the study.

The graphical representationof the evolution of the circumference of the contracted thigh circumference of the 4 subjects who participated in the studyis presented in figure 4. The left column represents the evolution of the thigh circumference growth percentage subsequent to the performing of the mechanical vibration therapy while horizontally the number of training sessions each subject performes is stated.

Conclusions

First, it should be noted that this study represents only one step in the framework of an investigation that is to be continued and developped. According to research in the field (Hopkins, 2000), the relevance of the results is questionable, because of the small number of subjects monitored, however some distinct conclusions consistent with the literature are highlighted.

The results of this study confirm that under the influence of mechanical vibrations more muscle fibers are activated, namely motor units, as compared to the simple muscle contractions. There is a directly proportional relationship, clearly highlighted, between the number of training sand the results of the parameters monitored during the clinical trial. Obviously, the mechanical vibration training is an effective tool in athlete training when it is accompanied by physical exercices part of the athlete classical training. Thus, the muscle groups subject to mechanical vibration are better trained, the immediate effect being that the muscles can be used quicker and and more efficient, also being able to generate more energy. A significant increase of the thigh circumference for the athletes who have performed at least 5 training sessions a week was also noticed.

The benefit of mechanical vibrationsin the athlete training is an area that still requires more specialized research in order to highlight as accurate as possible the manner in which they can be used to improve the athletic performance.

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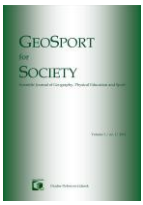

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Book review:

TEODOREANU Elena, GACEU Ovidiu, (2013),
Turismul balneoclimatic în România* (*Balneoclimatic Tourism in Romania),
Editura Universităţii din Oradea, 228 pag., 58 fig., 15 tab., references, (in Romanian).

This paper presents some of the greatest treasures of Romania, undervalued both national and especially international – air and water valorified in three types of bioclimate determined by the natural layering of the relief (tonic-stimulant, sedative-indifferent and turn-applicant), plus two indoor bioclimates (saline and cave), 11 types of mineral waters, numerous lakes (fresh, brackish and salty), therapeutic mud (mud, minerals and peat), therapeutic gases (pits, Solfatara). From ancient times until present more than 250 resorts have been created, both for local and general interest, and if we take into account locations with balnear conditions, the resorts of balnear interest will exceed 500 and thereby Romania can be a contender to certain countries with traditional tourist basins such as France, Germany, Spain, Italy, Greece etc.

All authors present a rich guide in scientific and practical information useful to students, master and PhD students specialized in this area less promoted and studied in Romanian geographical school, and the general public interested in knowing and using balneary potential of our country. After reading carefully the first 2-9 Chapters, the reader finds that the approach is going far more than the approach of guide by definition, description, methodology and scientific arguments taken from the fields of climatology., hydrology, geography, tourism, medicine. It has a scientific interdisciplinary character and a simple style, clear, concise, making publicly accessible, without affecting the quality of the science of expression, so it requires a work that should not be missing from the home of a nature lover, or hiking and so on, nevertheless for people with different medical conditions or those interested in maintaining physical and mental health, prevention, strengthening and hardening of the body, so the whole society knows that a nation and its people can't withstand, endure and progress in history if not keeping their strength, physical and mental vigor.

The second part of the paperwork is destined for all these categories of tourists, presented in geographic style, respectively all resorts are put into layers that describe natural features, therapeutic factors, conditions that are recommanded for, and treatment facilities used for visits, walks, or hiking trips that can be made in the surroundings.

The predominant character is geographic, a consequence of specialisation of its authors, highlighted throughout the book both by synthesizing information and by illustrating them with graphs and processed or original maps.

This paperwork developed by Ovidiu Gaceu and Elena Teodoreanu joins the few books that describe and argue the scientific balneary and therapeutic potential of Romania, although the first beginnings date back to 1930 (Ţeposu & Puşcariu, 1932), were continued later in the 1970-1980 by Munteanu et al. (1978), Teleki et al. (1984) and more recently by Teleki & Munteanu (2012) being the first to insist on this type of tourism of natural therapeutic factors, while trying to open a new interdisciplinary research direction - **Balneoclimatic tourism.**

By Grigore HERMAN & Anca POP

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