

How Sport Innovations Can Shape Sustainable Cities: An Interdisciplinary Approach

Jak innowacje sportowe mogą kształtować zrównoważone miasta: podejście interdyscyplinarne

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Abstract

Leveraging the potential of sport can play a significant role in shaping cities of tomorrow, generate environmental and social change. The integration of sport into city planning can provide multiple benefits, such as promoting physical activity, health, well-being, and enhancing social cohesion. However to date, there is a lack of research on the potential of sport innovations to enhance the sustainable development of cities. This study aims to explore the role of sport innovations in sustainable cities through systematic literature review, utilizing interdisciplinary approach that combines sport and urban management disciplines to understand how sport innovations affects the sustainable living. The findings of this study identify sustainable references in sport innovations literature, including best practices for integrating sport into urban planning and development, and thus verifying their contribution to the sustainable development of cities in areas of social inclusion, community participation, collaboration and networking, organizational strategy.

Key words: sport, sustainable cities, sport innovations, urban management

Streszczenie

Wykorzystanie potencjału sportu może odgrywać znaczącą rolę w kształtowaniu miast przyszłości, wpływając na zmiany środowiskowe i społeczne. Integracja sportu w planowanie przestrzeni miejskiej może prowadzić do licznych korzyści jak promowanie aktywności fizycznej, zdrowia, dobrego samopoczucia i wzmocnienie więzi społecznych. Jednak, do tej pory brakuje badań, które eksplorowałyby rolę i znaczenie innowacji sportowych na rozwój zrównoważonych miast. Niniejsze badanie ma na celu rozpoznanie roli innowacji sportowych na rozwój zrównoważonych miast poprzez systematyczny przegląd literatury, wykorzystując interdyscyplinarne podejście łączące dyscypliny sportu i zarządzania miastem, w celu zrozumienia w jaki sposób innowacje sportowe wpływają na zrównoważony rozwój miast. Wyniki badania wskazują na liczne odwołania do obszaru zrównoważonych miast w literaturze dotyczącej innowacji sportowych, w tym najlepsze praktyki w integrowaniu sportu w przestrzeń miejską, tym samym potwierdzając wkład innowacji sportowych na rozwój zrównoważonych miast w następujących obszarach: włączenia społecznego, partycypacji społecznej, współpracy i tworzenia sieci oraz strategii organizacyjnej.

Słowa kluczowe: sport, zrównoważone miasta, innowacje sportowe, zarządzanie miastem

1. Introduction

Owing to their multilevel nature, cities are place where various communities come together, facilitating the exchange of thoughts and knowledge within and between them (Dickey et al., 2022). The concentration of

a large and diverse population creates a network of relationships (Sun et al., 2022). These networks create the ability to express and share opinions, leading to intriguing ideas. Creativity and spontaneity, combined with a desire for change, can lead to innovation, including the creation of new services and products, and the modernization and improvement of existing ones (Yusuf, 2009). Cities are a places where sport infrastructure is unfolded and provides opportunities to practice sport, for both amateurs and professionals, thereby concentrating sport communities in urban spaces. Moreover, practical experience and tacit knowledge in the possession of sport practitioners and communities are meaningful factors in creating conditions for fostering innovation. Practical experience and tacit knowledge play crucial roles in establishing an environment conducive to innovation (Do Nascimento Souto, 2013). Tjønndal (2017) has been given a definition of sports innovations: *Sports innovation refers to the development and implementation of new ideas, changes, and advancements in various aspects of sports, such as technology, organization, and community involvement*. In similar vein, Ratten (2017) defines: *Sports innovation refers to the introduction of new ideas, technologies, and strategies in the sports industry to gain competitive advantage*. Therefore, innovativeness can be used as one of the measure for mitigating urban issues. The ongoing trend of urbanization has given rise to the development of sustainable cities, whose primary objective is to improve the quality of life of their inhabitants while minimizing their negative impact on the environment (Bibri and Krogstie, 2017). The concept of a sustainable city is a complex and multifaceted one, requiring a comprehensive approach that considers environmental, social, and economic factors (Dassen et al., 2013).

With the challenges facing today's cities, policymakers are moving toward balanced solutions and meeting the Sustainable Development Goals (SDGs), to this end, sport can be used as a contributor to sustainable development (Millington et al., 2021). This view is supported by United Nation's (UN), which include sport in strategic framework of sustainable development, as in the 2030 Agenda sport is presents: *Sport is also an important enabler of sustainable development. We recognize the growing contribution of sport to the realization of development and peace in its promotion of tolerance and respect and the contributions it makes to the empowerment of women and of young people, individuals and communities as well as to health, education and social inclusion objectives* (Nations, 2015). Due to its ubiquity, it is possible to leverage sport potential, to address all 17 sustainable development goals, with some goals being more or less influenced by sport (SPORT4SD, 2021). According to the UN report, sport can make an important contribution to the further development of the following Sustainable Development Goals (SPORT AND SDGs):

- **SDG 3 - Good health and well-being (notably targets: 3.1-3.5, 3.7, 3.9)**
The right to health promotes healthy lifestyles through physical activity and sport. Regular sports reduce non-communicable diseases, obesity, and contribute to child and maternal development, also promote health education, mental well-being, and sustainable consumption.
- **SDG 4 - Quality education (notably targets: 4.1, 4.3-4.5, 4.7, 4.a-4.c)**
Inclusive sport activities promote education rights, including equal participation for women and girls, disabled individuals, and vulnerable groups. Through special educational sports programs it is possible to foster academic performance, leadership abilities, and life skills; motivate children to attend school, and raise sustainability awareness.
- **SDG 5 - Gender equality (notably targets: 5.1, 5.2, 5.5, 5.c)**
Sport has the potential to be a vital tool for advancing gender parity and ending prejudice against women and girls. It may boost self-esteem, equal participation, and change culturally discriminatory practices. Community activities oriented around sports have the potential to empower women, create safe spaces, increase awareness.
- **SDG 8 - Decent work and economic growth (notably targets: 8.1, 8.2, 8.3,8.5-8.7, 8.9)**
The sport industry offers economic growth and decent employment opportunities. It promotes human rights, labor standards, and inclusivity. Sport-based education and employment create decent jobs. It generates community involvement, mobilizes the wider community, and fosters sustainable development. Sport tourism promotes local culture and volunteers' participation. There are opportunities for economic growth and proper employment in the sport sector, which is growing in size and links with other different industry sectors.
- **SDG 11 - Sustainable cities and communities (notably targets: 11.3, 11.7, 11.c)**
Sport's popularity and positive attitude make it an effective tool for addressing inequality, promoting tolerance and pro-social behavior in difficult to reach urban areas. Districts, neighborhoods where the city has identified social, economic or environmental issues can use sport to combat these challenges. Sports mega-events which are usually organized in urban areas can acknowledge diversity, foster mutual understanding, and tackle discrimination. Moreover, sports venues may function as hubs for inclusiveness and diversity, where people from different backgrounds can come together.
- **SDG 16 - Peace, justice, and strong institutions (notably targets: 16.1, 16.2, 16.3, 16.5, 16.10)**
Sport is a great channel of communication that supports human rights, peace, and unity among nations. It can help heal the psychological effects of war, facilitate demobilization and disarmament. In addition,

sport fosters equality, respect, and fair play while addressing risk factors for crime and violence. Sport organizations can be reformed to provide inclusive, transparent, and efficient governance while fostering a moral and legal culture.

- SDG 17 - Partnerships for the goals (notably targets: 17.9, 17.13, 17.16, 17.17, 17.19))

Sport is a flexible instrument for promoting sustainable development and peace objectives because of its mass appeal and universal nature. Multistakeholder networks involving governments, NGOs, sports organizations, academia, and the media can be established through it. Sport can also foster synergies, connect disparate industries, and pool resources. It can help gauge how close we are to achieving the SDG's.

According to UN Habitat recommendations 15% of the total urban areas should be used for open public space, hence in order to meet the needs of the population for sport, recreation and leisure, it is necessary to rethink the planning and use of public open spaces for enhancing healthy lifestyles (Stähle, 2018). In the light of Commonwealth analysis (Dudfield and Dingwall-Smith, 2015) a special attention should be paid to joint engagement in the development of policies on different levels, including local and national cooperation with sports stakeholders that drive urban planning and design of cities that facilitate and stimulate physical activity.

The evidence of multilevel cooperation for creating more sustainable cities can be clearly seen in Denmark's cities which hosts numerous sports events and is a sustainable tourist destination, with Copenhagen, Aalborg, and Aarhus among listed in Global Destination Sustainability Index (GDS, 2022) its top ten sustainable cities 2022 (GSS, 2023). The country has ambitious sustainability policies and climate action plans, including the Climate Act aiming for 70% emissions reduction by 2030 and climate neutrality by 2050 (GSS, 2023). Copenhagen, Denmark's capital, is aiming to become a sustainable and green city, integrating sustainability into all aspects of its life, including sports, to drive participation, improve quality of life and raise awareness of sustainability (GSS, 2023). The city government collaborates with sport event organizers to reduce environmental impacts and drive sustainable outcomes, for example, the city tested waste management strategies (a ban on single-use plastic at the EURO 2020 European football championships) and promoted the use of public transport (GSS, 2023). The city also aims to reach young people in disadvantaged city areas, improve access to sport (building sport facilities), and promote girls' participation in football (creation of new girl's teams) (GSS, 2023). The national body plays a crucial role in promoting sustainable practices, creating guidance and shares knowledge for establish comprehensive approach to sustainably hosting sport events (GSS, 2023). The case of Denmark has shown that sport is an important generator of urban change, especially for deployment of innovative and creative solution to challenge social and environmental issues.

Another example is the project *Smart Bodø* the initiative includes a comprehensive development plan for future urban planning of Norway city of Bodø using innovation in sport (social innovations) (Tjønndal and Nilssen, 2019). Sports actions were implemented within the framework of this initiative, the scope of which led to the creation of more sustainable and intelligent urban areas: (1) *Barnetråkk* - is a digital tool that maps children's movements and experiences in urban areas, allowing them to mark places associated with joy and danger (2) *BUA* - a Norwegian volunteer organization, offers free of charge sports equipment rentals to local communities, promoting social inclusion, sustainability, and environmental friendliness (3) *E-sport and Digital Kveld* - offering free computer games and e-sport competitions for children aged 9-14, the initiative aimed to teach them how to use digital tools without expensive programs (4) *the outdoor skateboard park* - initiative is planning an outdoor skateboard park, aiming to engage youth in meaningful play and physical activity, offering an alternative to organized sports and utilizing urban spaces (Tjønndal and Nilssen, 2019). The Norway case of city of Bodø shows that sports innovations play an important role in process of urban planning, creates more sustainable and active urban environment.

The United Nation's initiatives aimed at linking sports with the SDGs form part of a larger trend in the sport for development, where sport is increasingly being recognized as a means to achieve not only global development objectives, but also environmental sustainability goals (Sport and SDGs). The term Sport for Development (SFD) encompasses sport-based interventions that are specifically designed to address and promote social development objectives beyond the realm of sports, such as education, health, gender equality, disability, peacebuilding, and social cohesion (Schulenkorf et al., 2016; Whitley et al., 2018).

Sport and innovations are particularly important in the context of building regional growth (Next Generation EU, 2021) for sustainable future (Triantafyllidis and Mallen, 2022). The European Commission has introduced a number of innovation funding programs, most notably under the recovery plan called Next Generation EU program (Next Generation EU, 2021) with the total budget of € 750 bn for years 2021-2027, which could also potentially benefit sport stakeholders through financing their innovative projects aiming e.g. to improve the energy efficiency of existing sport infrastructure, promote sustainable transport, creates green sport infrastructure, enhance sport technology for active lifestyle and health related programs (Next Generation EU, 2021). Moreover, the sports sector holds significance for various specific goals outlined in relation to Horizon Europe the EU's research and innovation funding program including those concerning health, climate change, societal transformations, and smart cities (Next Generation EU, 2021). The vast funds available within the framework of the European Union for



projects in the area of sport innovations are a confirmation of its growing importance for sustainable urban development including, in particular, social development and climate protection. At the same time, the urgency of this study and, by the same extension, the inclusion of the topic of sport innovations in the broad discussion of sustainable cities is justified.

This article continues the thoughts of the study of Tjønddal (2017), which presented an original classification of sport innovations that comprises social, technological, commercial, community-based, and organizational innovation. Tjønddal (2017) emphasizes the need for additional research to fully understand the various types of sport innovations and their effects in diverse contexts and suggests an interdisciplinary approach to explore how innovation affects the growth and organization of sports in diverse cultural and societal settings. In particular, the role of sport innovations in creating and planning sustainable cities is unclear. Hence, there is a need to investigate the role of sport innovations in enhancing the sustainable development of cities and identifying best practices for integrating sport into urban planning and development.

Sport has been acknowledged as a significant means of promoting physical activity and well-being, however, its potential to advance the sustainability of cities has not been comprehensively examined. To date, research on the potential of sport innovations to promote sustainable urban development is limited, despite the recognized comprehensive benefits of sport (Gratton et al., 2005; Cornax-Martín et al., 2020; Xiang et al., 2023). This study aims to fill this gap by exploring the role of sport innovations in sustainable cities. The integration of sport into sustainable city planning can provide multiple benefits, promoting physical activity, health, well-being, and enhancing social cohesion. However, the question arises: How in particular sport innovations contribute to the sustainable development of cities? This paper is to explore the potential of sport innovations to enhance the sustainability and identify contributing factors in different areas of a sustainable city. The findings of this study can help identify the role of sports innovations in the development of sustainable cities. Given the above, this study is an attempt to uncover the potential of sport innovations on sustainable cities.

2. Methodology

The main research problem that we address is that it is unclear how, to what extent, and in what way sport innovations can be considered as a factor that builds cities of tomorrow. This study consists of an in-depth examination of the literature related to innovation in sports based on a review of the literature presented in Tjønddal (2017). This work is an extension and further elaboration of the study by Tjønddal (2017), which develops and suggests typology of sport innovation, identifying five types of innovations: social, technological, commercial, community-based, and organizational. Consideration of the broader role of sport innovations is the reason for the selection of an extensive body of literature that already exists, but it needs further content analysis to identify possible associations between sport innovations and sustainable cities, concentrating on sports innovations from the perspective of their influence on sustainable cities. The objective of this study is to identify articles in which sport innovations are associated with cities and may impact on the development of sustainable cities in the future.

This study refers to articles selected in a systematic review of the literature by Tjønddal (2017). Thematic analysis was used to identify factors related to sport innovation in sustainable cities. Thematic analysis is a highly regarded qualitative method, as proposed by Guest et al. (2012) and Nowell et al. (2017), which enables the extraction of valuable information and the discernment of connections between diverse variables. The process of analysis begins by reading the keywords and abstracts of articles to search for relationships and references to sustainability and urban issues in their content. The next step was to search for sport innovations factors that influence cities and sustainability by looking for specific terms and keywords in the text. Articles are then selected for further in-depth reading to find connections between sport innovations in the broad context of the city and their possible implications for sustainable city strategies.

The analysis process involves meticulously perusing the articles, examining the objectives and goals, and, most importantly, assessing the contribution of sport innovations towards sustainable cities in the articles. The subsequent steps are outlined in Figure 1 as part of the document analysis and review procedure:

- *Step 1. Identification*
Use the existing literature resource selected by Tjønddal (2017) through the implementation of a systematic literature review on sport innovations.
- *Step 2. Screening*
Search for keywords in the documents: *city, urban, civil, civic, municipal, community, inhabitants, local, sustainability, SDG, livable, environment, climate, habitat*. The keywords were selected based on their proximity to the terms *city, sustainability* and their relevance to the overall theme. Related words were also included in the search to broaden the scope of the results. By utilizing similar terms, the range of search results was expanded. The extracted phrases were then analyzed for context and interpretation.
- *Step 3. Inclusion*
The final selection was to find papers relevant to the objective of the literature search.



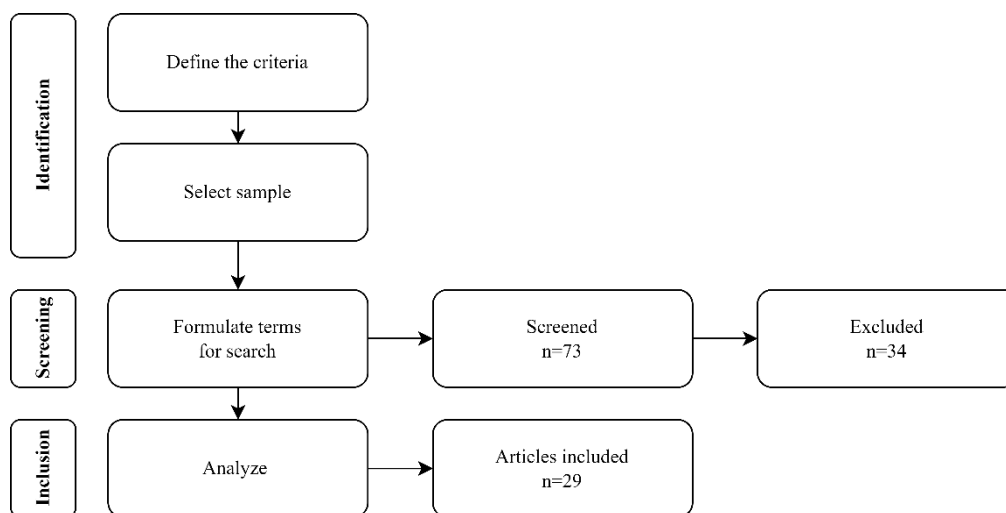


Figure 1. Literature review process, source: the authors based on Wolfswinkel et al. (2013)

3. Results

Due to their intricate and multifaceted nature, sport innovations employ a significant influence on the quality of daily life, and their far-reaching impact enhanced to promote initiatives that foster the urban solutions. The Table 1 presents the reviewed articles, and their sustainability factor, which was found and interpreted as having the potential to influence to the development of sustainable cities. An in-depth review of the literature revealed that sport innovations can be distributed among different city areas and can impact sustainable development. The following clustering of articles according to their type of influence has been introduced: social change, community participation, organizational strategy, collaboration and networking.

Table 1. List of articles included in review and their sustainable references, source: the authors based on (Tjønndal, 2017)

No.	Article	Topic	Sport innovation category	Sustainable references
1.	Balmer et al., 2012	Technological innovation in jumping events	Technological	references not found
2.	Boutroy et al., 2015	Innovation in outdoor sport	Community-based	references not found
3.	Caza, 2000	Innovation in Canadian boxing	Organizational	references not found
4.	Chi, 2005	Technological innovation in Martial arts	Technological	references not found
5.	Cohen & Peachey, 2015	Social entrepreneurs in sport	Social	Social inclusion
6.	Coontz, 2001	Sport bookmakers as entrepreneurs	Commercial	references not found
7.	Corte, 2013	Anlyze of profesional BMX riders	Community-based	Collaboration and networking
8.	Danylchuk et al., 2015	Organizational change in golf	Community-based	references not found
9.	Desbordes, 2001	Innovation management in sport	Commercial	references not found
10.	Desbordes, 2002	Innovation in sports equipment	Commercial	references not found
11.	Dulakakhoria & Jana, 2013	Innovation growth in sports industry	Commercial	references not found
12.	Duret & Angué, 2015	Innovation in outdoor sports	Social	Community participation
13.	Ellis et al., 2011	Innovation in hip arthroscopy/athlete	Technological	references not found
14.	English, 2016	Sport journalism and innovation	Technological	references not found

No.	Article	Topic	Sport innovation category	Sustainable references
15.	Esson, 2015	Youth entrepreneurship of footballers	Social	references not found
16.	Evans et al., 1997	Social inclusion of women in physical education	Social	Social inclusion
17.	Fredberg & Piller, 2011	Innovation: Sports industry	Commercial	references not found
18.	Füller et al., 2007	Innovation in basketball communities	Commercial	Collaboration and networking
19.	Goff et al., 2002	Innovation: Sports leagues	Social	references not found
20.	Goldshy et al., 2005	Entrepreneurship and fitness	Commercial	references not found
21.	Groves, 2011	Athletes as social entrepreneurs	Community-based	references not found
22.	Johnson, 2010	New innovations in sports medicine	Commercial	references not found
23.	Hall, 2006	Urban Entrepreneurship and sport	Commercial	Organizational strategy
24.	Harun & Salamuddin, 2013	Outdoor Education and Innovation	Organizational	references not found
25.	Hayhurst, 2014	Social entrepreneurship and sport	Social	Social inclusion
26.	Hienerth, 2006	User innovations: Rodeo kayak	Commercial	Community participation
27.	Hillairet et al., 2009	Innovation management in sporting goods	Commercial	references not found
28.	Hoeber et al., 2015	Innovation in community sport	Community-based	Community participation
29.	Hoeber & Hoeber, 2012	Innovation in community sport	Community-based	Organizational strategy
30.	Hunter, 2010	Innovation and creativity in sport	Organizational	references not found
31.	Hyysalo, 2009	Micro-innovation in sport	Commercial	Community participation
32.	Khromin et al., 2014	Municipal system innovations in sport	Organizational	Organizational strategy
33.	Lance & Antshel, 1981	Social factors in sport innovation	Social	references not found
34.	Liang, 2013	Creativity in sports mega events	Commercial	references not found
35.	Loy, 1968	Adoption of technological innovation	Technological	references not found
36.	Lüthje, 2004	Innovating users in sport	Commercial	references not found
37.	Lüthje et al., 2005	User-innovators: Mountain biking	Community-based	references not found
38.	D. A. M. Miragaia et al., 2015	Social entrepreneurship and sport	Community-based	Organizational strategy
39.	D. Miragaia et al., 2016	Innovation in sport organizations	Organizational	references not found
40.	Mountjoy et al., 2009	Technological innovation: swimming	Technological	references not found
41.	Newell, 1995	The diffusion of innovation in sport	Organizational	Collaboration and networking
42.	Nordin & Svensson, 2007	Innovative destination governance	Commercial	Collaboration and networking
43.	Okayasu et al., 2016	Sport entrepreneurship	Community-based	Social inclusion
44.	Pantza & Shove, 2010	Understanding innovation in practice	Social	Community participation
45.	Pegoraro, 2014	Innovation in sport communication	Technological	references not found

No.	Article	Topic	Sport innovation category	Sustainable references
46.	Fredberg & Piller, 2011	Rethinking sport teaching	Organizational	references not found
47.	Pinch & Henry, 1999	Disruption in Technological innovation	Technological	Collaboration and networking
48.	Parris et al., 2014	Athletes as entrepreneurs	Commercial	references not found
49.	Ratten, 2010	Sport management	Social	Social inclusion
50.	Ratten, 2011a	Sport entrepreneurship	Social	Social inclusion
51.	Ratten, 2011b	Sport-based entrepreneurship	Social	Social inclusion
52.	Ratten, 2011c	Social entrepreneurship in sports	Social	references not found
53.	Ratten, 2012	Sport entrepreneurship	Organizational	Collaboration and networking
54.	Ratten, 2015	Athletes as entrepreneurs	Organizational	references not found
55.	V. & F. J. J. Ratten, 2016a	Sport entrepreneurship and innovation	Organizational	references not found
56.	Ratten, 2016a	Sport leadership and innovation	Social issues and policy	references not found
57.	Ratten, 2016b	Sport, innovation and public policy	Organizational	Community participation
58.	V. & F. J. J. Ratten, 2016b	Sport entrepreneurship	Organizational	references not found
59.	Ringuet-Riot et al., 2013	Technology innovation in sport	Technological	Collaboration and networking
60.	Rossi & Rynne, 2014	Sports development programs	Social	Social inclusion
61.	Sheridan, 2007	Technical innovations in sport	Technological	references not found
62.	Sousa, 2016	Innovation and municipal sport firms	Organizational	Organizational strategy
63.	Speed & Roberts, 2011	Innovation in high-performance sport	Technological	references not found
64.	Tjønndal, 2019	Innovation and inclusion in elite sport	Organizational	references not found
65.	Tjønndal,	Innovation for social inclusion in sport	Social	references not found
66.	Tjønndal, 2016b	Sport, innovation and management	Technological	references not found
67.	Trabal, 2008	Resistance to innovation in elite sport	Technological	references not found
68.	van der Woude et al., 2006	Innovation in rehabilitation	Technological	references not found
69.	Viljamaa, 2007	Local innovation initiatives	Community-based	Social inclusion
70.	Von Hippel, 2001	Innovation in user communities	Community-based	Community participation
71.	Winand & Vos, 2013	Determinants of service innovation	Organizational	Organizational strategy
72.	Winand & Hoerber, 2016	Innovation in sports organizations	Organizational	Organizational strategy
73.	Yoshida et al., 2013	Sport event innovativeness	Commercial	Organizational strategy

3.1. Social inclusion

Sports bring with it the potential for social change and provide social benefits to society through innovation and entrepreneurship (V. 2011a. Ratten, 2011; V. 2011b. Ratten, 2011; V. 2011c. Ratten, 2011; Cohen and Peachey, 2015; Ratten, 2015). The relationship between sport and entrepreneurship has a positive impact on public health, social inclusion, economic development, and intercultural exchange (Cardella et al., 2021), contributing to marginalized groups and individuals (McSweeney et al., 2022). For instance, cities use sporting events to facilitate social change and focus on social challenges in local communities (Ratten, 2010). In addition, Rossi and Rynne



(2014) in their research emphasized and explained the role of government-funded projects aimed at improving the well-being of indigenous communities, which are often unfairly excluded from social life. Another relevant example is the Japanese government, whose strategic plan is to develop the social aspects of the community through innovation and entrepreneurship of comprehensive community sports clubs (Okayasu et al., 2016). Furthermore, one of the existing practices is to use sports as a catalyst and means of change for sustainable development (Cohen and Peachey, 2015). Sports creates opportunities for development to achieve gender and equality goals by introducing sport programs oriented towards girls' development (Hayhurst, 2014). Also, introducing initiatives that promote equity and greater participation of women in physical activity and sports (Evans et al., 1997) or programs that include common access to sports for all (Viljamaa, 2007). These measures respond to the need to consider the important role of women and ensure gender equality through sport, thus realize the objectives within the framework of sustainable development goals (SDG's) number 5 Gender Equality.

3.2. Community participation

Involving the public and communities in the innovation process is a highly intriguing approach to urban management, particularly for the creation of a sustainable city as it presents an abundance of opportunities for cooperation between citizens and the government in the creation of collaborative innovation in urban spaces (Sørensen and Torfing, 2016). Local authorities play a critical role in fostering stronger social interactions and promoting participation in sports by implementing innovative programs and policies (Ratten 2016b). Hyysalo (2009) observed that users influence micro-innovation, and best practices incorporate their participation in the evolution of innovation at various stages, including testing. Pantzar and Shove (2010) maintain that individuals involved in the innovation development process are engaged in experimentation and training. This perspective is further reinforced by the authors' emphasis on potential participants' active participation in the innovation process. Duret and Angué (2015) add that the central role of users in social innovation within the realm of outdoor sports cannot be overstated. Active participation and engagement of players are crucial prerequisites for achieving successful innovation (Duret and Angué, 2015; Hoeber et al., 2015). Hienerth (2006) also indicate that user innovators drove product development and commercialization by creating a fast-growing community using low-cost techniques and starting a new industry before established manufacturers could enter. In the same way, Von Hippel (2001) emphasizes the significance of comprehending the community as a crucial element in driving innovation, as it serves as the impetus for change.

3.3. Collaboration and networking

Cities serve as crucial resources for achieving common goals through collaboration circles as they possess land, buildings, and infrastructure. An example of the interaction between the sports community and city authorities is the story of BMX riders, which presents the social movement and participation in the development of new sport initiatives (Corte, 2013). The level of willingness to participate and innovative potential are key factors that determine the success of cooperation between sports organizations and communities (Füller et al., 2007). The systematic development of sports innovations creates opportunities for sports organizations (Ringuet-Riot et al., 2013), which are the impulse for organizational change, including increasing collaboration and establishing inter-organizational networks (Newell, 1995), and focuses on entrepreneurial innovation in the creation of public-private ventures for the development of tourism destinations (Nordin and Svensson, 2007). One example is the determination of the site for sports facilities and centers, which is typically the responsibility of urban planners, who consider a multitude of factors prior to reaching a decision. Innovation is also a critical element in the growth of sports and regions, as highlighted by Pinch and Henry (1999) in their examination of the *Motor-Sport Valley* as a crucial hub for motorsports innovation, both in the region and the UK. Similarly, Ratten (2012) suggests that policy planners can provide valuable guidance to sports organization managers to help them establish effective structures that promote innovation for regional development.

3.4. Organizational strategy

Cities' entrepreneurial strategies may consist of changes in management approaches to sports projects and programmers. The idea of entrepreneurial orientation has been explored within the context of public institutions, suggesting that strategic entrepreneurial techniques, including problem-framing and collaboration, arise in these types of organizations (Ratten, 2020). The establishment of new governing bodies for sports is a strategy that cities can employ in the management of sports projects and programs (Sousa, 2016). This can be achieved by incorporating leadership traits, embracing innovation and digital transformation, and fostering an entrepreneurial culture within public organizations (Van Geenhuizen, 2004). Furthermore, similar activities regarding the approach to innovation can be observed in nonprofit sports organizations, where innovation plays an important role in organizational management in competitive environments (Winand & Vos, 2013), fulfilling customer needs (Winand and Hoeber, 2016). The innovativeness of sports events can be used as a strategy to gain competitive advantage in the global economy and has the power to change consumer behavior and increase

community engagement, as demonstrated by Hall (2006) and Yoshida et al. (2013). Another relevant example is the incorporation of sports and physical culture into urban strategic management plans at the municipal level, which was recognized as a system innovation in management (Khromin et al., 2014). Leadership commitment, pro-innovation characteristics, organizational capacity, simple organizational design, and involvement and interest of external parties were determined to be the key determinants of this innovation process, as per Hoerber and Hoerber (2012). Corporate social responsibility frequently involves backing sports at the community level, as research indicates that such initiatives often yield intangible benefits, such as heightened visibility and enhanced market position, rather than immediate gains. (D.A.M. Miragaia et al., 2015). Considering the aforementioned perspective, it may be anticipated that a comparable relationship exists between cities committed to the development of sustainable urban sports (Sport and SDGs).

4. Discussion

The literature analysis indicated that sport innovations can affect urban sustainability through their impact in the four areas and enhance (Figure 2):

- social inclusion,
- community participation,
- collaboration and networking,
- organizational strategy.

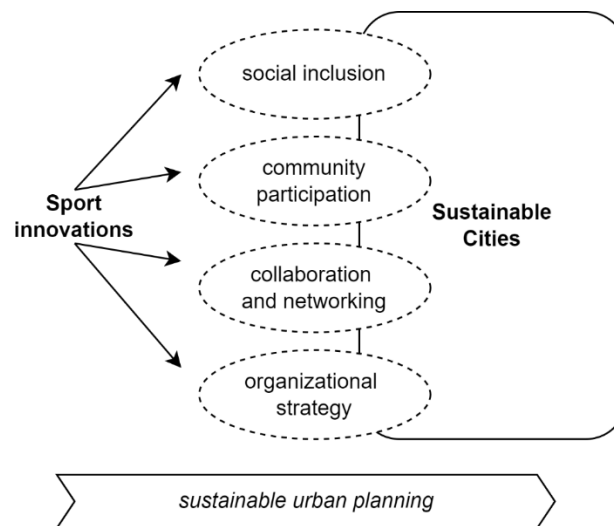


Figure 2. Sport innovations areas of influence on sustainable cities, source: the authors

Leveraging the potential of sport innovations is expected to translate into a change in the approach of urban management, considering and integrating sports ventures and projects of an innovative nature into the overall sustainable urban planning process (Figure 2). The evidence presented so far supports the idea that sports innovations impact daily life and enhances sustainable living. Sport can bring about social change and urban benefits through entrepreneurship and innovation (V. & F. J. J. Ratten, 2016b). The relationship between sport and innovation has a positive impact on social inclusion and participation, collaboration and organizational strategy. Cities use sporting events to facilitate social change and focus on social challenges in local communities (Ratten, 2010). Government-funded sport projects aim to improve the well-being of indigenous communities (Rossi and Rynne, 2014). Sport can be used as a catalyst for sustainable development and can create opportunities for development to achieve gender and equality goals (Hayhurst, 2014). Community participation is a highly intriguing approach to urban management and can foster cooperation between citizens and the government in the creation of collaborative sport innovation in urban spaces (Corte, 2013; Duret and Angué, 2015). Notably, the literature indicates the central role of users in social innovation (Von Hippel, 2001) within the realm of sports and the importance of players' active participation and engagement in spatial and functional changes in cities (Corte, 2013), for example, in the location of sport facilities, construction of new multi-purpose outdoor and indoor stadia, and finally, solutions to enhance the voice of individuals in overall urban planning (Zhou et al., 2021). The aforementioned examples prove that leveraging the potential of sport innovations contribute to build citizen-friendly cities, providing cities with a balance between technology, and human approach, therefore moving cities towards sustainable future.

The literature review and thematic analysis has identified four areas in which urban sustainability can be impacted, while the aspect of public health, which seems to be an obvious benefit of sports at the same time,

seems to have been overlooked. Through a balanced and sustainable approach to urban planning, innovations in sport aims to improve physical but also mental health of citizens by providing access to green spaces and places for play and physical and social activities (Rocha et al., 2019). The promotion and enhancements for sport can have a positive impact on well-being and boost sustainable living (Rocha et al., 2019; Lindsey et al., 2020). Likewise, engaging citizens in sport and physical activities are a remedy for chronic illnesses which are major public health problems for numerous metropolises (Giles-Corti et al., 2016). In view of the above, it is surprising that no references was found in the reviewed literature referring to public health, an relevant issue related to the another relevant city concept of healthy cities (WHO, 1990). Thus, the literature reviewed indicates the impact of sports innovations on various areas of the city, but does not take much into consideration the overall impact on healthcare, which seems to be very related and relevant component of sustainable cities.

It should be also stressed out that the links between sport innovation and the concept of a sustainable city are not obvious, meaning they are not directly indicated in the literature. While the authors often suggests that sport innovation can be a source for urban change, it is not combined with urban agendas, there is a lack of inclusion of sport in a sustainable urban planning process. This article points out the lack of sport planning in innovate urban space. A potential scenario of usages of sport innovations are covered now, therefore, in further consideration of this topic, it is worth deliberating what sort of benefits sport innovations might deliver to the various actors in urban life (e.g., authorities, business, NGOs, residents and communities). A broader exploration of the topic will help identify potential new approaches to urban management by integrating sport innovation into sustainable urban planning and strategic management, bringing livable and sustainable cities.

5. Conclusions

As sustainable development of cities becomes increasingly central to everyday lives, it is important to understand how different factors can affect their developing. This study investigated and identifies sustainable factors in sport innovations literature, among 73 reviewed articles in 28 of them were found the sustainable factor that can contribute to the development of urban sustainability. In general, therefore, the results show the importance of sport innovations, as a catalyst of urban change in four areas: social inclusion, community participation, collaboration and networking, organizational strategy. Understanding the role of sports communities in the urban planning process is important from the point of view of the human centric approach, which is a relevant for sustainable cities, where the environment friendliness should go in parallel with the development of technology. Sports innovations can build bridges and connect communities, providing them with the opportunity to participate in the development of cities, by incorporating innovation, organizations can introduce novel methods of sports-based management that may be further incorporating by policymakers and city planners. A holistic view at the concept of sustainable cities is needed and justified, due to its multidisciplinary nature. This article is an attempt to expand the concept of sustainable cities to another area such as sports and innovation, bringing a fresh perspective to the present discussion in this topic. The abovementioned results provide a significant first step toward filling the gap regarding the current insufficient consideration of the role of sports in shaping sustainable cities. Moreover, the results of this article indicate the importance of paying attention to the urban health and well-being, the innovativeness in sports can enhance active and healthy lifestyle, further research in this direction would be important for the development of healthy and sustainable cities.

However, a number of limitations need to be considered. For instance, given that sports sector is a multifaceted area where different actors come together, from a sustainability perspective, it will be important to involve, in addition to policy makers, which are the main impactful bodies for city change, sports organizations including professional sports clubs which implement elements of sustainability actions in their everyday operations. Confirmation of the aforementioned is a successful case of the Tottenham Hotspur Football Club, which is actively involved in actions that address climate change and environmental issues. One of the club's strategic goals is to become a net zero carbon emission by 2040 committing by signing of the UN Sports for Climate Action Framework *Race to Zero* (Sports for Climate Action). The club's commitment to sustainability is evident in many aspects of their activities; uses of renewable energy for powered stadium and training facilities, waste management programme *zero to landfill*, locally and sustainably sourced food, sustainable transportation (four train stations and free matchday shuttle bus), the shirts made from 100% recycled polyester from plastic bootless (Tottenham Hotspur). The club is also a top-ranked Premier League football club in the Sport Positive ranking (PL 2022) because it receives the highest points in key sustainability indicators, which refer to commitment, policy, energy, food, biodiversity, education, and communications.

In the light of the study sport innovations contribute for building a sustainable cities, nevertheless the reviewed literature seems to lack its own reference to the role of sports organizations and their leaderships in this process, and moreover, there is no focus on their activism for climate protection and the fight against environmental change, particularly the reduction of their carbon footprint. The literature does not sufficiently address innovations that are addressed to global climate change issue. Further research should be done to examine how innovation in sport may affect the climate and environment. Moreover, the study did not present the role and responsibilities of sports

organizations in terms of sustainable development, resulting from organization of mega sports events, which significantly impact the natural environment through the construction of numerous facilities and the increase of CO₂ emissions during construction and use, and other factors such as the movement of fans, including, air, and car travel to sports events, which are also a source of increased CO₂ emissions.

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