

RESEARCH ARTICLE

A Study on the Sustainability of Large Sporting Events and Host Cities-The Harbin Asian Winter Games as an Example

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ABSTRACT

This study examines the relationship between major sports events and urban sustainability, using the Asian winter games in Harbin, China, as a case study. This study investigates the effects and offers practical policy recommendations for communities looking to host significant sporting events while promoting sustainable urban growth. Major sporting events have a global audience, which offers tremendous potential for advancing urban sustainable development. The main objective of this study is to investigate the effects of major sporting events on urban sustainable development using the Asian winter games in Harbin as an example. Significant findings define that sporting events are important forces behind urban development, aiming to boost a city's standing abroad, promote economic expansion, and raise the standard of living for its people. This study highlights the significant opportunity large-scale sports events present for urban sustainable development while underscoring the importance of planning, management, and evaluation. The Harbin Asian winter games offer valuable lessons for other cities to achieve sustainable development goals better, ensuring the success of hosting major sports events aligns with the city's sustainable development. The results of this study provide helpful guidance for future similar research and practical endeavours.

INTRODUCTION

Urban sustainability, which includes social, environmental, and economic aspects, is at the forefront of modern society development (Spiliotopoulou and Roseland, 2020). Cities are crucial in determining regional, national, and global sustainability since they are the hubs of economic networks and agglomerations (Toli and Murtagh, 2020). The challenges of the global urban age in the twenty-first century highlight the need for sustainable urban development (Sartison and Artmann, 2020).

Sports have become more of an economic activity in recent years. According to projections from the Grey Press, in 2021, sports made up 3.3% of the GDP in the EU and 3.6% of the GDP in Spain. Consequently, because sport is a significant element of the economy, it must also be a sustainable activity, particularly when it comes to one of its primary economic drivers, athletic events (Bácsné-Bába et al., 2021).

Major sporting events, as external forces for urban construction, significantly influence cities' development trajectories. As ideal platforms for large-

scale sports events, cities capitalize on these occasions to drive sustainable urban development (He et al., 2020). The transformative impact extends beyond being international spectacles; they become unique opportunities for host cities to accelerate construction and development. The paper aims to delve into this crucial intersection of major sporting events and urban sustainability, focusing on the Harbin Asian Winter Games (AWG). The AWG, hosted by Harbin in 2025, represents the largest Asian winter sports event with profound practical significance (Liu et al., 2022). Beyond its scale, the AWG catalyzes Harbin's fast-paced development, emphasizing the city's commitment to sustainable practices. This event is poised to elevate Harbin's status as a global ice and snow tourism hotspot, echoing the success achieved following the 1996 Asian winter games (Li et al., 2021). Harbin's prowess in hosting large-scale ice and snow events is evidenced by its well-equipped venues, including the Harbin Ice Hockey Stadium, Heilongjiang Provincial Ice Training Base, and the International Convention and Exhibition Center Gymnasium (Xiao et al., 2020). The city's legacy, built through events like the 2009 World University winter games, the 2012 and 2016 FIS Speed Skating World Cup, and the 2015 and 2016 Snowboarding World Championships, exemplifies its ability to host world-class competitions (Zhen, 2023). The accumulated experience positions Harbin as a formidable contender, successfully securing the hosting rights for the ninth Asian winter games in 2025.

Harbin's strategic leveraging of its ice and snow resources extends beyond hosting events. It has created a unique eco-tourism brand, exemplified by attractions such as the Harbin Ice and Snow World, the Yabuli Ski Tourism Resort, and numerous public ice rinks and indoor ice sports centres (Ning et al., 2022). These initiatives highlight the city's commitment to maximizing the potential of ice and snow tourism, establishing it as a global leader in the sector. The study's theoretical significance comes from filling a knowledge vacuum on the connection between big-time athletic events and urban sustainability. Although these kinds of events can change cities, only some thorough research studies have examined their long-term effects (Bertolini, 2020). By performing

thorough research and utilizing the Harbin AWG as a case study, this work seeks to close this gap. From a theoretical standpoint, the study investigates the meanings of urban sustainability and the complex relationship between significant athletic events and sustainable urban development. By analyzing the Harbin AWG's history, scope, and distinctive features as the host city, this study aims to provide critical insights into how big athletic events support urban sustainability.

The practical significance of the research is exemplified by Harbin's journey in hosting major ice and snow events (Mair and Smith, 2022). The city's success stories, from the 1996 Asian winter games to subsequent international competitions, demonstrate the tangible benefits of hosting such events. These range from economic growth and industry development to enhancing the city's global reputation and creating lasting legacies for the public. Exploring these practical experiences provides valuable lessons for other cities aiming to host similar events (Mair et al., 2023). The paper will define urban sustainability and the complex interaction between sustainable urban development and significant sports events. An overview of the significance of sustainable urban development can be gained from the body of existing literature (Angelo and Wachsmuth, 2020). Nonetheless, there is still a significant knowledge vacuum about the long-term effects of major sports events on urban sustainability. Although it is recognized that these events act as outside forces on urban construction, stimulating economic growth and leaving positive legacies in their wake (Keshavarz et al., 2023; Rashid et al., 2023), a thorough investigation into the complex relationship between essential sports events and the various facets of urban sustainability is lacking.

As cities increasingly vie for the opportunity to host major sporting events, such as the Harbin Asian Winter Games (AWG) in 2025, the question gains practical significance. Harbin's successful bid and extensive experience in hosting ice and snow events, from the 1996 Asian winter games to subsequent international competitions, position it as an ideal case study to unravel the complexities of this relationship (Miller and Mössner, 2020; Meidrina et al., 2017). Thus, the research addresses this critical gap by

posing the question: How can major sporting events, exemplified by the Harbin AWG, serve as catalysts for sustainable urban development, contributing to economic, environmental, and social dimensions? This question aligns with the current discourse on urban sustainability and seeks to uncover actionable insights for cities navigating the intersection of major sporting events and sustainable urban practices.

LITERATURE REVIEW

Sustainability has become an increasingly common factor in sports organizations, sporting events, and actions linked to corporate social responsibility (McCullough et al., 2019). However, several authors indicate that more than recognition is needed, and more effort is required from stakeholders to promote sustainability in sport (McCullough and Cunningham, 2010; Into and Gempes, 2018; Jam et al., 2018). In this sense, nowadays, sustainability has been firmly established as one of the emerging scientific research topics in the field of sport management (Lis and Tomanek, 2020), generating a large area of interest for further development of scientific literature linked to the SDGs (Fonseca et al., 2022). In the same vein, the proposal by McCullough et al. (2020) for the recognition of a new sub-discipline within sports management has become known as sports ecology.

The meaning of sustainable urban development

Major sporting events foster economic growth and stimulate urban development (Mason, 2022). Henshaw and Bruce (2012) highlight the case of Manchester and Sheffield, old industrial cities in the United Kingdom, undergoing industrial restructuring and facing challenges such as population out-migration. Gratton and Solberg (2007) emphasize these cities' need to rebrand and create new employment opportunities. They assert that hosting sports events and investing in sporting infrastructure attracts tourists and draws foreign investment, altering the city's image and catalyzing economic transformation (ELfakharani and Albaheth, 2023; Rashid et al., 2023; Maditinos et al., 2021).

According to scholars such as Essex, large-scale events such as the Olympic Games not only result in building new sporting facilities but also entail significant infrastructure renovation, extension, and development. This includes enhancing public

infrastructure services and improving roads, communications, and transportation (Herbold et al., 2020). Using the Formula One event as an example, Kim et al. (2021) explore the effects of sporting events on urban sectors through input-output analysis. Testa et al. (2023) show that holding such events significantly impacts the manufacturing sector in addition to sports-related industries like sports, travel, and lodging.

Furthermore, the study underscores that event revenue is more significantly affected by the participation of non-local or international participants compared to local participants. Notably, the impact of non-local or international participants on event revenues in the host country surpasses that of local participants (Zawadzki, 2020). Sustainable urbanization can be defined at two levels: the sustainability of cities and the sustainable development of cities. "Sustainability" emphasizes a state which is, in essence, a set of constraints on human society (Hautbois et al., 2020).

Meanwhile, "sustainable development" describes the process of a system from its initial state to the point of demonstrating sustainability and emphasizes the direction of development rather than an end state. Thus, "sustainable urban development" is the process of realizing "urban sustainability", while "urban sustainability" is the ultimate goal of "sustainable urban development" (Mourão et al., 2022). Sustainability is the ultimate goal of "sustainable urban development" "Sustainable city" refers to a city's current state of ecological, environmental preservation, resource efficiency, individual well-being, and meeting fundamental human requirements (Gannon et al., 2022). The process of urbanization that allows for the effective management and resolution of ecological, social, and economic tensions is known as sustainable urbanization. It is possible to assign equal weight to social, economic, environmental, and governance sustainability in the dynamic process of sustainable urban development.

There is a specific interactive relationship between the three pillars of sustainable cities, which is composed of the three pillars of sustainable development, namely, the environment, the economy, and the society, as the elemental composition and

the contradictions between the three pillars are resolved in the construction of sustainable cities. New connotations are given to the sustainable development of cities through the goal of sustainable cities (Bibri, 2021). The environment, economy, and society always exist in a city, and artificially severing the links between the three will destroy the city's wholeness and make it challenging to realize urban development goals. However, in the process of sustainable urban development, there are also certain contradictions in the level of prioritization between the economy, the environment, and society, which need to be resolved in the goals and processes of sustainable urban development, as shown in Figure 1.

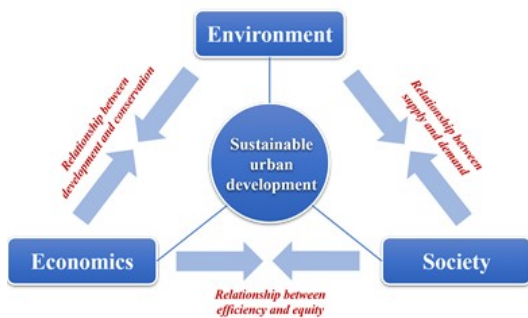


Figure 1: Potential contradictions in the process of sustainable urban development

Development and protection are incompatible at the intersection of the environment and economics. While economic expansion can lead to development, it can also cause resource depletion and damage to the ecological environment. As a result, when assessing economic benefits, it is essential to consider the environment's carrying capacity, make up for the reasonable loss of environmental values, and put appropriate safeguards in place. However, suppose we focus on the environment and do not develop and use resources well. In that case, we will impede economic growth and urban development, which will negatively impact inhabitants' ability to live better lives and raise their living standards.

Major sports events and urban sustainability

Scholars' sports theories are vastly different from those of domestic scholars, who typically see sports events from the standpoint of events and classify them as unique events, developing a more sophisticated and specialized field theory. According to Karayev

et al. (2021) Leo Kenneth Jago, an exceptional event lasts a specific amount of time, happens only once, or infrequently.

Getz (2008) defines special events from two perspectives, the organizer and the consumer, respectively: the organizer's perspective is mainly from the perspective of the event itself and the frequency of its occurrence, which is not replicable and occurs infrequently; the consumer's perspective is mainly from the perspective of experiencing and participating in the event, and the special event is beyond the scope of daily experiences and choices, and it is an opportunity for leisure and for gaining a social or cultural experience (Hillman et al., 2021). Special events can be small or large, meaningful events that meet a particular need in a unique period (Halliday et al., 2022). Combining and summarizing the scholars' literature, it is found that they have yet to reach a consensus on the concept of large-scale sports events so far, and they primarily define it from the dimensions of the number and characteristics of event participants. From the quantity perspective, Emery believes that the number of spectators should be at least 1,000 or more to be considered a significant sports event (Gratton and Solberg, 2007). According to Roche, a significant sporting event draws more than 500,000 spectators (Roche, 1992). According to Marris (1987), there should be a financial investment of 2.5 billion francs and a visitor count of at least one million for mega-events. Spilling notes that in addition to requiring a substantial financial outlay, a major athletic event generates demand, offers a service, and draws over 100,000 spectators (Spilling, 1996). Roberts defined discontinuity, internationality, non-routine ness, big audience size, and widespread media distribution as characteristics of important athletic events (Rimington et al., 2009).

According to Rooney, Horne, and other scholars, sports mega-events have two characteristics: firstly, there is a large amount of media publicity and coverage of the event; secondly, the country or city where the event is held has a significant international influence (Horne and Manzenreiter, 2006). Similar literature is available on Hall (1987) and Rooney and Usa (1988) bureau of economic and business research, University of Utah. Through the combing of the literature of the above domestic and foreign

scholars, ic community can see the concept of large-scale sports events, mega-events precise definition of the concept of there is no uniform statement, the synthesis of the above scholars' research as well as this paper's research needs to be a large-scale sports event is defined as a large-scale and has a significant social impact on the competitive level of the high level of the special events, such as the Olympic Games, the Asian Games, and so on.

Utilize event environmental management to further the long-term enhancement of the urban

environment. Large-scale sporting events require material protection and platform support, which a healthy urban environment provides. It is impossible to separate event planning and execution from an orderly, secure, and comprehensive urban environment. During major sporting events, the host city typically implements several efficient policies and plans to fulfil the event's environmental goals. This makes the most of the occasion to enhance the urban environment and raises the bar for urban environmental planning and construction.

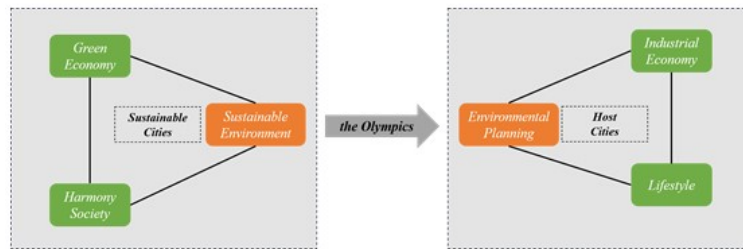


Figure 2: Contribution of the three pillars of sustainable cities to the development of Olympic host cities

The sustainable development of the host city is an essential prerequisite for the continuation of the Olympic Games. Whether the city's environmental planning, industrial economy, and social life can be improved through the opportunity of hosting the Olympic Games, and at the same time avoiding the negative impacts to the greatest extent possible, is the consideration of whether the city should bid for hosting the Olympic Games or not. The promotion of sustainable cities for the sustainable development of the Olympic Games needs to be implemented in the sustainable development of the host city through the three pillars of a sustainable environment, a green economy, and a harmonious society to lead the city's Olympic environmental planning, the industrial economy and the construction of lifestyles to promote the sustainable development of the Olympic Games, see Figure 2.

THE BACKGROUND OF THE HARBIN ASIAN WINTER GAMES

At a meeting in Bangkok, the Olympic Council of Asia General Assembly unanimously decided to hold the games in Harbin, the capital of Heilongjiang province, the council announced in a news release. In 1996, the

Third Asian winter games were held in Harbin. The games were held in 2007 at Changchun, the capital of Jilin province, which is nearby. Japan's Sapporo hosted the most recent Asian winter games in 2017. At an estimated cost of \$38 billion, China held the 2022 Winter Olympics in Beijing; nevertheless, the aftermath of the global epidemic negatively impacted subsequent tourism.

History and scale of the Asian winter games

Since the inception of the Asian winter games, a total of 1,163 medals have been produced, of which 387 gold medals, 383 silver medals, and 393 bronze medals, see Table 1. From the distribution of the medals, 82.03% of the medals are distributed in the East Asian region, which is 64.49% more than in the Central Asian region in the second place, thus showing that the East Asian region in the Asian winter games in the stage of absolute strength. Though not as strong as East Asia in terms of competition, the Central Asian region still has certain advantages over other regions, having won about one-fifth of the medals. West Asia is weaker, having earned only 5 of the 1,163 medals, although its overall medal total has increased over time. The fact that neither Southeast Asia nor South Asia has yet to earn a medal indicates that not justly competitive

these two countries' winter sports are, but adversely competitive each Asian winter games region is.

Throughout the development of the Asian winter games, among all the 32 countries or regions that have participated in the Asian winter games, only 10 countries or regions have won medals, of which only 7 have won gold medals, and the total number of medals

exceeding 100 is only 4, as shown in Table 2. Japan, China, Kazakhstan, and South Korea are ranked in the top 4 of the medal table, and are far ahead of other countries and regions; the 4 countries won a total of 320 gold medals, accounting for 99% of the total number of gold medals, with almost monopoly of the absolute advantage.

Table 1: Statistics on the distribution of medals by region in previous Asian winter games

Region	Gold Medal		Silver Medal		Bronze Medal		Trophy	
	Number	Proportion	Number	Proportion	Number	Proportion	Number	Proportion
East Asia	307	79.33%	317	82.77%	330	83.97%	954	82.03%
Central Asia	79	20.41%	64	16.71%	61	15.52%	204	17.54%
West Asia	1	0.26%	2	0.52%	2	0.51%	5	0.43%

Table 2: Statistics on the distribution of medals in previous Asian winter games

Rank	Country/Region	Gold Medal	Silver Medal	Bronze Medal	Total
1	Japan	138	144	115	397
2	China	94	85	105	284
3	Kazakhstan	78	62	56	196
4	South Korea	74	83	92	249
5	North Korea	1	4	12	17
6	Uzbekistan	1	2	4	7
7	Lebanon	1	1	0	2
8	Mongolia	0	1	6	7
9	Iran	0	1	2	3
10	Tajikistan	0	0	1	1

The impact of the 1996 Asian winter games on Harbin

The Asian winter games should have been held in North Korea, but North Korea ultimately gave up due to a lack of capacity. Harbin, in the Asian winter games from the opening of only three years when acted as a "firefighter"; the results created "Asian Winter speed". By hosting the Asian winter games, Harbin has become the earliest city to hold international ice and snow competitions, so for how to host and organize ice and snow events, "young" Harbin has a particular right to speak. China's ski industry was born in 1996, which was marked by the establishment of the Yabuli Tourist Ski Resort (Zhang et al., 2007). This year, "Yabuli" was remembered by the world. Yabuli Ski Resort not only meets the reception needs of the Asian winter games but also strongly promotes the development of

China's ski industry and the number of Chinese skiers through the geometric progression of growth. In 1996, China's domestic skiing was less than 200 times, but by 2004, the number of skiers had reached millions. In 1996, there was only one tourist Ski Resort in Windmill Mountain Resort, but by the end of 2004, the number of ski resorts in Heilongjiang province alone had reached 78. At the same time, the ski industry chain has begun to form in China. Of course, many of these ski resorts need sound supporting facilities, poor snow environments, a lack of professional staff, and many other problems. However, the Asian winter games has dramatically enhanced my love of snow and ice tourism and enhanced the people's participation. The following set of data will be able to fully illustrate the impact of the Asian winter games on ice and snow tourism in Harbin; see Figures 3, 4, and 5.

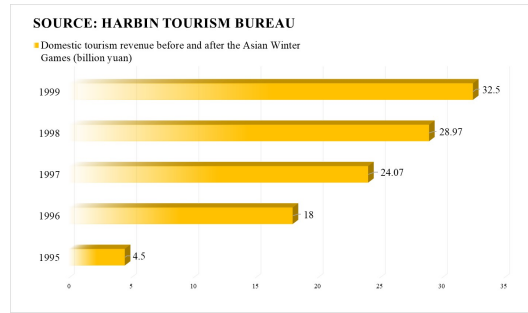


Figure 3: Bar chart of the domestic tourism income before and after the Harbin Asian winter games

The domestic tourism revenue during the Asian winter games increased by 300% compared to the same period in 1995.



Figure 4: Bar chart of the inbound tourism income before and after the Harbin Asian winter games

125.9% of inbound tourism revenue during the Asian winter games.

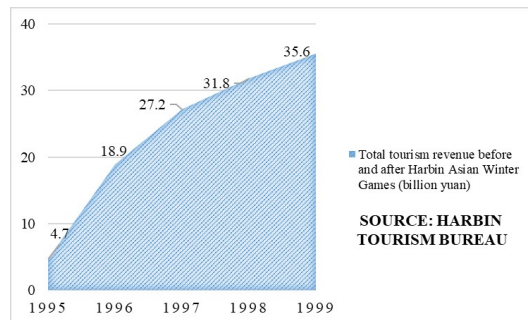


Figure 5: Bar chart of the total tourism income before and after the Harbin Asian winter games

The total tourism revenue increased by 276% during the year of the Asian winter games.

By comparing the data, it can be seen that in

the year when the Asian winter games were held, both domestic tourism revenue and inbound tourism revenue, as well as the total tourism revenue, surged,

with a year-on-year growth of 300%, 125.9% and 276% respectively compared with 1995, and then steadily increased on this basis in the following years. However, the growth rate has declined, but the overall trend has still been on the way up. This shows that in the year of the Asian winter games, Harbin tourism was on a new level, standing at a new height of development. As the skiing program was not popularized and was not the focus of Harbin ice and snow tourism at the time, snow and ice tourism revenue mainly from the ice lantern parade and Sun Island Snow Sculpture, so the separate snow and ice tourism revenue data is not sufficient, there is no way to illustrate the part of the surge must come from the snow and ice tourism. However, the current data is sufficient to illustrate that the Asian winter games greatly enhanced the Harbin in the country, Asia, and even the world's fame and played a crucial role in attracting tourists.

RESEARCH METHODOLOGY

This study is based on qualitative research. This study is a comparative one from the standpoint of research design. Documents and semi-structured interviews are the sources of the data. Document analysis is widely considered a prevalent method for data collection in qualitative research and is particularly compatible with policy studies. Thematic analysis is used to analyze the collected qualitative data. The duration of each interview was 1-1.5 hours. Before the interviews, the researcher had ethical approval from the committee. The researcher also provides info on the aim of the research, procedures, and interview questions to the interviewees. The interview content was recorded and transcribed with their consent. Confidentiality is guaranteed, and only the researcher can access the data.

ANALYSIS AND DISCUSSION

Targeting and quantitative assessment of sustainable development in Harbin

Sustainable city is often associated with Sustainable Urban Development, Urban Sustainability, etc. The three terms are based on the goals, processes, and conditions of urban development of the concept of sustainable development, and they respectively elaborate the application of sustainable

development ideas in urban development from different perspectives.

The original understanding of sustainable development, which categorizes the real world into social, environmental, and economic dimensions, advocates for a future that combines sustainability, inclusiveness, and resilience to risk for people and the planet. The triple bottom line concept was first put forward by British scholar Jeurissen and Elkington (2000), specifically to harmonize the development of the economy, the environment, and society. As a new value criterion for social success, the triple bottom line is a comprehensive assessment of organizational or societal behaviour from the environmental, economic, and social perspectives. In other words, organizations and societies must develop sustainability to harmonize their interests, their communities, and the environment. Sustainable development must be achieved by harmonizing social inclusiveness, economic growth, and environmental protection, as the relationship between the three directly determines the well-being of cities and people.

While the sustainable city is based on the urban development goal and development mode under the guidance of the concept of sustainable development, this paper takes economy, environment, and society as the elements to consider the sustainable development of the city and takes the urban development goals of sustainable environment, green economy and harmonious society as the three pillars of the sustainable city.

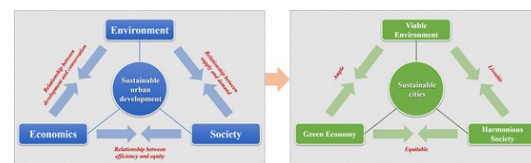


Figure 6: Resolving environmental, economic, and social tensions through the three pillars of sustainable cities

Under the leadership of the three pillars of a sustainable city, namely, green economy, survivable environment, and harmonious society, the contradictions between development and protection between the economy and the environment, between efficiency and equity between the society and the

economy, and between supply and demand between the environment and the society in the development of the city are expected to be balanced and to acquire new connotations, as shown in figure 6.

The system of indicators of sustainable urban development was established based on the latest results of many domestic and foreign studies on the general theory of sustainable development and the characteristics of the city as a unique system. It is a synthesis of urban development conditions, composed of several interconnected and complementary hierarchical and structural indicators. It is an organic series composed of several interrelated and complementary indicators with hierarchical and structural characteristics. Establishing the indicator system should be guided by certain principles and goals of sustainable urban development, based on the objective reality of the stage, level, and regional nature of sustainable urban development, and comprehensively reflecting, characterizing, and measuring the connotation and goals of sustainable development. Establishing the evaluation index system for sustainable urban development must

conform to the basic norms of statistics and follow the six principles of scientificity, operability, relative completeness, dynamism, relative independence, and relevance.

To eliminate the non-comparability of indicators due to the influence of the unit of measurement, the data were standardized using the following formula, taking into account the characteristics of the data themselves and the purpose of the analysis:

$$y_i = (x_i - \min x_i) / (\max x_i - \min x_i)$$

Where y_i is the standardized data, x_i is the original data and $\max x_i$ and $\min x_i$ are the maximum and minimum values of the index in the original sample, respectively.

Combined with the characteristics and objectives of Harbin city's development, this paper establishes the urban sustainable development indicators, consisting of 35 indicators of five subsystems: economy, society, population, resources, and environment. It standardizes and organizes them using the formula (1) to calculate the comprehensive development index of each subsystem. The calculation results are shown in Figure 7.

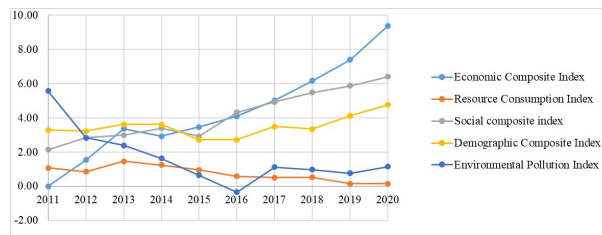


Figure 7: The trend of subsystem sustainable development in Harbin city

Economic development has been on an upward trend, and the population has been developing unstably. From Fig. 7, the curve of resource consumption shows a continuous downward trend, which indicates that the efficiency of the industrial enterprises is improving, and the energy and water consumption per unit of industrial output value is decreasing, so the index of resource consumption continues to decline.

Impact of the Asian winter games on sustainable development in Harbin

There are many types of large-scale sports events in the world, but "large" has two meanings: one refers to the massive scale of the event, and the other refers to the significant impact of the event.

Existing large-scale sports events can be divided into two categories from the content of the event, namely, comprehensive sports events and single sports events, comprehensive Olympic Games, Asian Games, the World University Games, etc.; single World Cup soccer matches, the world's professional tennis, the world swimming championships and so on. Regardless of the type of event, they are characterized by a long planning cycle (usually three to seven years), a large number of events or participants and teams, and a long competition time. Through the analysis of the overview of festival tourism, it can be determined that the Asian winter games held in Harbin in February 1996 is a kind of festival tourism, which is a tourism

activity with the theme of sports events, and in essence, the AWG is not held for tourism, but instead, it has an impact on the local economy, society, culture, environment, and even the world status of the place

where it is held by hosting a large-scale event, see Figure 8.

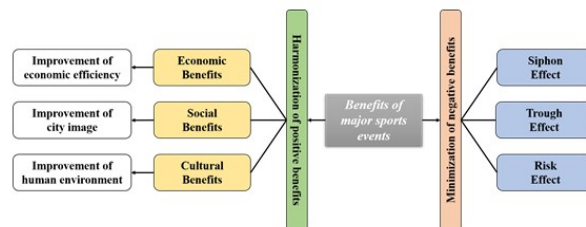


Figure 8: Influences on the host brought by significant sports events

The following is a specific analysis of the impact of significant events on the location where they are held. First, economic benefits - to enhance the national economy and drive the tourism economy. Economic benefit is the inevitable requirement of every hosting place for organizing large-scale events. Through the event's organization, large-scale athletes and coaches come to participate, including the arrival of journalists and spectators from various countries, which can bring abundant income to the local economy.

A large amount of money is injected to drive the development of the national economy, a large number of tourists to drive the arrival of the tourism industry and other related sectors of economic development, and a large number of consumption and service demand and increased employment opportunities. Here is the Sydney Olympic Games as an example to analyze a brief description. The 2000 Sydney Olympics achieved unprecedented and outstanding gains. In terms of direct operations, the Sydney organizing committee had a net expenditure of A\$1.74 billion, a primary income of A\$2.43 billion, and a total profit of A\$765 million (equivalent to about 3.5 billion yuan) from the pooling of other incomes, making it the most economically profitable first Olympic Games in modern Olympic history. The results of all aspects of its operational process significantly exceeded those of the previous Olympic Games in Atlanta, United States. Second, there are social benefits, such as enhancing the country's image to attract tourists. Holding large-scale events can significantly enhance the status of the venue in the world; hosting large-scale events is a symbol of a country's economic strength and

embodiment of a country's political image, which can inspire a nation's sense of honour and sense of responsibility. Organizing large-scale events can also drive the local people's enthusiasm for sports and improve people's physical fitness; the construction of the event venues during the games can also attract foreign tourists and provide residents with places to exercise.

Thirdly, cultural benefits - improving the nation's quality is an internal impetus for tourism development. Holding large-scale sports events is not just a matter of the place where they are held but also a matter of a country, and showing them to international friends in good spirits is one of the purposes of organizing the events. In the process of organizing and conducting the event, it is a process of improving the quality of residents. Different cultures in the region will also have significant differences in the event's hosting, such as the style of the stadium building, the athletes' village hospitality mode, and so on. Both the venues, the athletes' village, and the food of the athletes are a reflection of culture. These can attract tourists and residents, and improving cultural quality also boosts the intrinsic motivation for tourism development.

DISCUSSION

Everything is dual, and every phenomenon has benefits and drawbacks. Large-scale athletic event hosting is no exception, showing both advantages and disadvantages. Examining how significant events affect the host sites reveals complex effects with a definite temporal aspect. While the negative

consequences could last long, the positive effects frequently do not.

For instance, during the 2000 Sydney Olympics, prices for accommodations, tourism, and food surged nearly three to five times, causing strong dissatisfaction among residents and tourists (Lin, 2012). Research indicates that several Olympic host cities saw inflation following the 1984 Summer Olympics in Los Angeles (Johnson, 2019). Even competitions praised as the "best Olympics" by former IOC president Samaranch could not shake the post-Olympic blues. Sydney's home state of New South Wales saw significant increases in investment in the four years preceding the Olympics, accelerating GDP growth (Madden, 2002). Nevertheless, post-event investments fell precipitously and grew negatively, severely impeding GDP growth. The pre-Olympic situation was not restored until 2003 when the investment growth rate reached 10% again. We call this phenomenon the "post-Olympic slump."

The Asian Winter Games (AWG) brought opportunities for ice and snow tourism development in Harbin but also had specific negative impacts on the city's development (Luo et al., 2019). First, the Harbin city administration spent a large sum of money and time upgrading indoor and skiing venues to prepare for the winter games. Much money was given to these locations, which might impact other building projects and ice and snow tourism programs. Second, the winter games caused Harbin's ice and snow tourism industry to reach maximum capacity. Following the event, the event's popularity quickly dropped, which might have hurt tourism and other areas of the host community.

This trend typically gives rise to a "post-event slump." Therefore, how the venues are constructed, and the newly invested tourism facilities during the event are better utilized is a challenge that Harbin should actively address. It is hoped that Harbin's municipal government and relevant departments can plan effectively to manage the "post-event slump" that follows major sporting events.

Based on the context of the Asian winter games 1996, this study presents an overview of Harbin's sustainable development approach, but with limitations regarding incomplete data collection. This article aims to explore urban sustainable

development in Harbin further and contribute to the city's development.

CONCLUSION

This study uses the Asian winter games in Harbin, China, as a case study to investigate the relationship between major sporting events and urban sustainability. We arrive at the following conclusions after carefully examining the background and scope of the Asian winter games, the features of the host city, Harbin, and the effects of the 1996 Asian winter games on Harbin, draw the following conclusions:

A sustainable city is prosperous, equitable, and livable, formed at the intersection of the three pillars of a viable environment, a green economy, and a harmonious society. It plays a crucial role in addressing the contradictions between urban economic development and environmental protection, fairness and efficiency in social and economic aspects, and the supply and demand conflicts between the environment and society. This study offers a thorough analysis using the 1996 Asian winter games in Harbin as an example, concluding that organizing major events can improve the prestige of the host city, draw sizable visitor numbers, and positively affect the local economy and society based on the analysis of the industry's development, at Harbin's ice and snow tourism has stabilized for a while and reached a relatively high level. Thanks to the hosting of AWG, there are now more chances for horizontal growth in terms of material circumstances and social standing.

Continuous assessment and monitoring are essential for the sustainable development of cities through sports events. By regularly assessing the impact of sports events, cities can make adjustments based on actual circumstances and continually improve their sustainable development strategies. This helps ensure that cities can maximize the benefits of sports events and maintain sustainability even after the events conclude.

In summary, this study highlights the significance of planning, management, and assessment while highlighting the substantial possibility that major sporting events offer for urban sustainable development. By guaranteeing that the success of hosting important sporting events aligns with the

city's sustainable development, the Asian winter games in Harbin provides other communities with invaluable lessons on how to accomplish sustainable development goals better. The study's findings would offer helpful direction for subsequent investigations and real-world projects.

Limitations and future prospects

A number of the study's limitations suggest more research directions. It is necessary to interpret the results cautiously and, more importantly, to encourage future research endeavours to validate the theory in alternative contexts using probability-sampling techniques for increased robustness, even though this is not unprecedented in research methodologies. The primary constraint of this research is the scantiness of the publications' analysis that was found.

It is advised that each research project's material be thoroughly examined in light of prospective developments. This would allow progress in developing analysis procedures and determining whether or not there is agreement on their application, as well as in establishing analysis indicators and figuring out how to measure athletic events' influence.

This study's geographic scope is severely limited because most survey responses were in Harbin, China, primarily focused on the automotive sector. Future research initiatives should examine other nations and industries outside of the Harbin, China, environment to increase the findings' robustness and applicability. Furthermore, this strategy would prove the ongoing applicability and efficacy of Sustainability of Large Sporting Events and Host Cities. However, future researchers can improve this study framework and refine it, allowing for its assessment in both developed and emerging situations. This comparative study can highlight differences in management approaches and enable a more in-depth examination of the findings' parallels and divergences in various contexts. Such initiatives will develop more profound insights into the dynamics of environmental management practices by advancing the understanding of the study theory applicability and generalizability.

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