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Breaking Ice: An In-depth Examination of China's Winter Sports Participation in the Wake of Beijing 2022

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Is there evidence from secondary data to suggest advancement towards Beijing 2022's objective of "Motivating 300 million individuals to engage in winter sports"? This study explored the Beijing 2022 sport participation legacy by adopting a quantitative approach with triangulation. The preliminary findings highlight the multifaceted and complex nature of evaluating the sport participation legacy goal of a Sport Mega Event (SME). The broad definition of the goal to "Motivate 300 million people to engage in winter sports," as well as the characteristics of the political mission's cultural and systemic context, were some of the factors that played an important role when trying to assess this target. Moreover, this paper revealed three crucial mechanisms transmitting the passion of winter sports from SME to mass participation legacy, through quantitatively examining the promised target. There were "Leveraging sports policy", "Provision of facilities accompanying the integration of sport and education", and "Cooperative stakeholders` alliance strengthened by media power and technology". We anticipate that this study will make a valuable contribution towards addressing the challenges posed by the broad and ambitious nature of Beijing 2022's goal, whilst facilitating further investigations on the transformative strategies.

Keywords: *Winter sports participation; Impact and legacy; Beijing 2022 Winter Olympics; Social sustainability; Triangulation*

Introduction

As the world turned its gaze toward the historic Beijing 2022 Winter Olympics and Paralympics, the first Olympic Games ever to implement a legacy plan adapting Olympic Agenda 2020/ New Norm and the International Olympic Committee (IOC) Legacy Strategic Approach, one goal stood at the forefront: an impressive and ambitious goal that challenged the boundaries of sport participation. Against the backdrop of a global pandemic, these Games etched their place in history, not only as a testament to human resilience but also as a harbinger of a new era in winter sports. It was here that Beijing beckoned to the world, daring 300 million individuals to embrace the thrill of ice and snow activities, setting an unprecedented milestone

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in the Olympic movement. This study centers on the assessment and achievement of this ambitious participation goal, which serves as the primary focus of our research.

The IOC Sport for All Commission Declaration underscores the shared vision of past, present, and future host cities to promote increased sports participation (IOC, 2021). Scholarly research and practical evidence suggest that hosting sport mega events (SMEs) has the potential to boost sports participation (Pappous & Hayday, 2016; Weed et al., 2015) and foster sustainable development (Hindson et al., 1994; Hogan & Norton, 2000). Within this context, the Beijing 2022 Winter Olympics and Paralympics embraced the ethos of 'Sport for All' by setting their sights on attracting 300 million people to engage in the thrills of ice and snow activities. As we delve into this study, our aim is not to definitively assess whether the "300 million" goal, which originated from the promise "Developing a winter sports market for more than 300 million people" in the bid document" (Beijing 2022 Olympic Winter Games Bid Committee, 2014), has been fully achieved, as it is an ongoing endeavor. Instead, we aim to assess the progress made towards realizing this ambitious goal and gain insights into the challenges.

Official sources now report that over 346 million Chinese people have actively engaged in winter sports since 2015 (BOCWOG et al., 2021). During IOC sessions. workshops and Observer Programs concerning legacy and sustainability, some international experts have raised questions about the precise delineation of participation in winter sports, as well as the origin and validity of the reported number of "346 million", possibly due to the limited availability of supporting literature, linguistic barriers, systemic configurations, and cultural distinctions. This numerical milestone of over 346 million people engaged in winter sports was based on the results of an official survey conducted by the General Administration of Sport of China (GAS) and the National Bureau of Statistics of China (NBS). Employing stratified random sampling, this survey involved 12,340 respondents across 31 provinces and autonomous regions in China. Its findings from 2015 to 2021 indicate that 24.56% of Chinese residents directly or indirectly engaged in winter sports (GAS, 2022). This largescale engagement involves people who practice ice and snow sports, such as athletes and coaches, but also covers the spectrum of people who indirectly engage in winter sports, such as participants in winter experiential events and the working staff of the Chinese winter sports industry (Chen et al., 2022).

Overall, the findings of this survey suggest that the Chinese winter sports market is growing, with a diverse range of contributors. While official government-commissioned surveys provided beneficial perspectives, it's essential to acknowledge the advantage of triangulation. Triangulation, a research approach that combines multiple data sources or methods, enhances the reliability and validity of findings. Therefore, in complementing the official survey results with a wide range of secondary data, this study aims to offer a more comprehensive and nuanced understanding of the complex landscape of winter sports engagement in China.

Moreover, future editions of the Games such as Milan-Cortina 2026 envisioned "Games for All" also emphasize sport participation, in light of the same Olympic sustainable strategy and legacy framework. Attempting to inspire the legacy planning and execution of future winter SME globally and contributing to the further development of the scaling up Chinese winter sports industry, we engaged in triangulation to inspect the facts and evidence of whether a sports participation legacy was delivered by Beijing 2022.

The mainstream literature suggests that additional indicators and longitudinal data are necessary to empower researchers to examine the sport participation legacy of major sporting events. Regarding the research gap, this study is guided by the research question of whether there are facts and evidence suggesting the advancement towards Beijing 2022's objective of motivating 300 million individuals to engage in winter sports. We then select additional indicators, which reflect annual fluctuations in winter sports participation, from people, facility/equipment, and market perspectives. Examining these indicators not only facilitates international observers in studying the sustainability and legacy of Beijing 2022 in detail but also provides references to researchers conducting international comparison studies to bridge the gaps corresponding to knowledge transfer.

Literature Review

The Definition of Winter Sports Participation in Prior Investigations

The definition of sport participation in prior investigations has varied, often based on the context of grassroots sports, where physical activity and engagement by ordinary people are monitored. Some studies have not distinguished between random and regular sport participation (Scheerder et al., 2011), with random participation referring to joining sports festivals or events (Gau et al., 2022) and regular participation referring to committing to physical training and sports education (Wicker et al., 2013). Other investigations have identified sport participation with physical activity engagement during the previous four weeks (England, 2022), while many investigations have operationalized a more precise quantitative concept, such as the proportion of adults aged 16 or older who engaged in sports at moderate intensity for 30 minutes or more at least once in the past week (Sports Science Research Center, 2022). Additionally, the sport participation concept has referred to both mass and elite sports participation in some contexts, and different age criteria or discipline-specific definitions have been suggested in other studies (Breuer et al., 2011; Downward & Riordan, 2007; Humphreys & Ruseski, 2009; Leslie et al., 2004). In the context of winter sports, there needs to be an explicit definition and clear indicators to measure the winter sports participation.

Preceding Work on Sports Participation Legacy

The current body of literature on sports participation at international SMEs is at a developing stage where there were 6 preceding literature reviews providing periodical evidence for a cluster of research questions, and the mainstream research focus was on the efficiency and effectiveness of the leverage policies. Within the limited and focused research interest in the social science area, which typically includes education, training, destination branding, volunteering, etc. (Mair & Smith, 2021), we identified a pattern of addressing the public participation legacy of

London 2012 OG and PLG with multiple attempts to develop gold standard theories and research frameworks to inspire future generations.

Besides, the selected literature in the social science area demonstrated interdisciplinary characteristics penetrating medicine, administrative management, and business management branches. Based on the PRISMA-ScR paradigm, we carefully examined 62 peer-reviewed journal articles, coming from preceding works. Based on the characteristics of the selected investigations, we divided the samples in the final corpus into 3 groups based on the events` features and motivations: (1) Case study of Olympic Games and Paralympics, (2) Non-Olympic Games case study or comparison study focusing on practice, and (3) Theory development-centric study.

The majority of previous investigations have focused on examining whether the host nations have successfully increased physical activity participation through hosting international SMEs (Shi & Bairner, 2022), such as the Summer and Winter Olympics, Paralympic Games, and World Cup. A small number of researchers, represented by Kim & Kaplanidou (2024) and Ribeiro et al. (2022), discussed how would sports participation benefit international sporting success. At the same time, it is worth noticing that research on the legacy creation mechanism and delivery process has gained popularity in the past decades. In many cases, governments use the 'demonstration effect' or 'trickle-down effect' to promote physical activities and improve national brands (Hindson et al., 1994; Weed et al., 2015). By contrast, the autonomous approach has been suggested by a group of pioneering scholars, for example, Brown, Gérard, and Pappous (2019).

Regarding the various attempts and needs to figure out a path leading to the sustainability, we carefully inspect the research paradigm, methods, and essential outputs of the preceding academic works in each group. The analysis results highlight the scarcity of empirical studies with mixed research methods while revealing a need for further research to fully understand sports participation in different contexts.

In general, we identified critical research gaps in scrutinizing the sports participation legacy and its delivery process of the latest three Olympics held in Asia. Moreover, the limited application of theoretical paradigms indicates a need for more continuous studies after the Games with international comparative frameworks to examine sports participation, targeting establishing gold stand theories and protocols for social sustainability.

The Juguo System

The Chinese sports system, referred to as "Juguo Tizhi" (举国体制), has a rich history and a complex framework. It is characterized by a top-down approach, with the government playing a leading role in identifying, training, and supporting elite athletes. The system has been influenced by the Soviet-style sports system and has undergone significant reforms since the 1980s. The evolution of the system reflects changes in sports philosophy as well as shifts in societal priorities. Initially, at the establishment of the People's Republic of China (PRC), the primary focus of sports was to enhance and optimize national self-esteem and contribute to civil defense efforts.

The "Juguo Tizhi" is composed of three layers based on geographical and administrative features. From the administration perspective, the three layers are GAS, Provincial Sport Administrations, and Urban/Prefectural Sport Administrations. From the dimension of sports teams, the three layers are the National teams, Provincial teams, and Urban/ Prefectural teams. The fundamental structure of the Three-Layer Sports Administration System has remained remarkably consistent throughout modern Chinese history. GAS serves as the overarching body, responsible for formulating sports strategies and policies in alignment with the nation's economic and social development plans. It creates guidelines, allocates resources, and oversees the execution of sports-related activities. The national teams select and develop top-level athletes with guidance and all-around support from GAS. The Provincial Sport Administrations, funded by local government, execute the tasks assigned by GAS, and support the operation of provincial teams. Meanwhile, they take responsibility for developing detailed plans with specific conditions of the region, distributing resources based on the rules, and supervising the third-layer subordinate organizations.

The Chinese Winter Sports Federation (CWSF) emerged as the apex association overseeing all winter sports within the GAS system. This formal structure pointed to the importance of coordinating and regulating winter sports activities across the country. Prior to the successful bid for Beijing 2022, only a few selected Provincial, Urban, and Prefectural Sport Administrations were entrusted with the development of both winter and summer sports. This allocation of duties significantly influenced the distribution of resources and the prioritization of sports development in specific regions, such as Hei Longjiang, Jilin, Liaoning, Beijing, Hebei, Neimeng, Jiangsu, Guangdong, and Xinjiang.

GAS, joined by the Chinese Ministry of Education, National Development and Reform Commission (NDRC), and the Ministry of Finance developed strategies and programs to advance China’s standing in winter sports on a global scale at both elite and mass sports level. Divergent stakeholders managed to integrate their own interests into the government-commissioned plans from the pre-Game stage to the after-Game period. The Beijing Organizing Committee for the Winter Olympic Games (BOCWOG), working in collaboration with schools, universities, local governments, and commercial organizations builds various types of talents for the promotion of winter sports. Beyond the realm of medal-winning winter sports disciplines such as figure skating, short-track speed skating, and speed skating, we have observed a significant transformation in the popularity of ice hockey, skiing, and snowboarding. The implementation of a series of strategies and programs, including "promoting ice and snow sports from north to south, east and west", "promoting ice and snow sports on campuses" and so on (GAS, 2016), contributed to the achievement in the sports involvement domain (BOCWOG et al., 2021).

Methods

Overview

This study aimed to achieve a triangulation perspective by examining a wide variety of quantitative indicators, including secondary data from 2015 to 2021, the official timeframe for the winter sports participation legacy. The sources for this study include publicly available quantitative data related to sports participation before and after Beijing 2022. These data sources encompass government reports, official event records, surveys conducted by relevant sporting organizations, and market reports from companies or non-profit institutions. Moreover, Baidu index, which is an effective tool similar to Google Trend for trend analysis indicating changes in information query behavior through search volume at the Chinese popular search engine "Baidu", has been engaged to examine Chinese internet users` interests in winter sports. We aimed to include data that would reflect changes over those 7 years, to provide a comprehensive analysis of any potential changes in sport participation levels.

Data Collection

The cumulative data from the telephone survey conducted by GAS and NBS does not depict the changes during the seven years. Therefore, we collected longitudinal data from the official website and policy documents of GAS and CWSF, the Olympic World Library, the IOC official website, NBS, International winter sports industry reports, Statista, and other confidential resources.

Data Selection and Analysis

Several indicators that directly or indirectly reflect winter sports participation were selected. These indicators were selected based on the following criteria:

- Relevance: The indicators must be relevant to the research question, which is to examine the impact of the Beijing 2022 Winter Olympics on winter sports participation in China.
- Availability: The indicators must be available from 2015 to 2021, the same period as that of the official survey.
- Reliability: The indicators must be valid measures of winter sports participation.

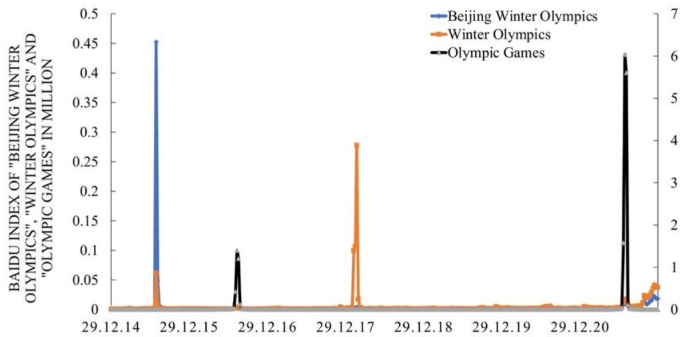
For data analysis, we independently examined each category of variables and performed descriptive analysis. Then, we examined China's crucial facilitators and featured sports to achieve the "300 Million" goal.

Results

Dynamics of Winter Sports in China

Figure 1 demonstrates the change in Chinese internet users` interest in Beijing 2022, the Winter Olympics, and the Olympic Games in general during the preparation for Beijing 2022. The peak search volume of the Beijing 2022 Winter Olympics appeared in July 2015, one year after Beijing won the bids. And the next rise started in July 2021, 7 months ahead of the hosting of Beijing 2022. Meanwhile, the peak search volume for the Winter Olympics emerged in February 2018 when the PyeongChang 2018 Winter Olympics were held by South Korea, and the Tokyo 2020 Olympics, which started in July 2021, created a boom in the search for the Olympic Games in Baidu. In contrast, our results show lowest search volumes in all the 3 keywords in January and February 2015. The average search volume (per week) was around 3000 for Beijing 2022 in the Pre-Game phase, around 4300 for the Winter Olympics, and more than 47000 for the Olympic Games.

Figure 1. *Search Volume of Beijing 2022, Winter Olympics and Olympics from 2015 to 2021*



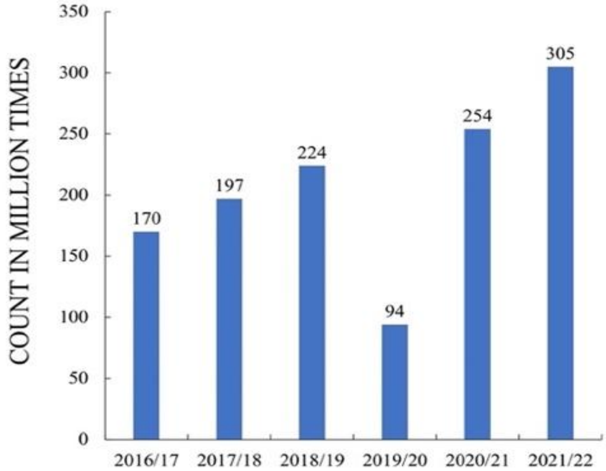
Winter sports not only attracted Chinese internet users but also those who took action to embrace the joy of ice and snow sports activities, although the online tendency doesn`t always correlate to sports participation behaviors. According to the ice and snow industry reports and popular Chinese news media, the number of site visits (in some literacy written as the number of winter tourists) reflects the development of ice and snow sports industry, facilitating winter sports participation. Figure 2 shows that the number of visits to ski resorts and ice rinks in China generally increased from the 2016/17 season to the 2021/22 season. However, there was a sharp drop of 49.27% in visits from the 2018/19 season to the 2019/20 season due to COVID-19 and related policies (Worldbank, 2021). From the 2019/20 season to the 2020/21 season, the number of visits increased from 94 million to 254 million, representing a pre-Games increase of 170.21%.

From the dimension of sports discipline, the medal winning disciplines such as figure skating (23.23%), short track speed skating (13.31%) and curling (19.63%) received the most attention. While ice hockey (12.89%), luge (8.31%) and snowboard

(7.24%) caught eyes of Chinese netizens according to the historical Baidu Index from the beginning of 2015 to the end of 2021 (see Figure 3).

Besides, online stakeholders in different regions voluntarily respond to Chinese winter sports promotion strategies and programs, such as "promoting ice and snow sports from north to south, east and west". Figure 4 displays the geographic distribution of Chinese winter sports enthusiasts corresponding to their information query behaviors. Beijing, Guangdong, and Jiangsu provinces ranked in the top 3 in the search volume of Beijing 2022 WOG from 2015 to 2021. In contrast, OG attracted many Chinese netizens from Guangdong, Zhejiang, and Jiangsu, 3 non-hosting provinces with high-speed economic and social development in China.

Figure 2. *Total Number of Visits to Ski Resorts and Ice Rinks in China (in millions)*



Note. Each season is divided based on the fiscal year of Chinese ice and snow sports industry, which begins from 01. May of the same year and ends on 30. Apr. the next year.
Source: Forward the Economist (Forward the Economist, 2022).

Figure 3. *Baidu Index per Winter Sports Discipline from 2015 to 2021*

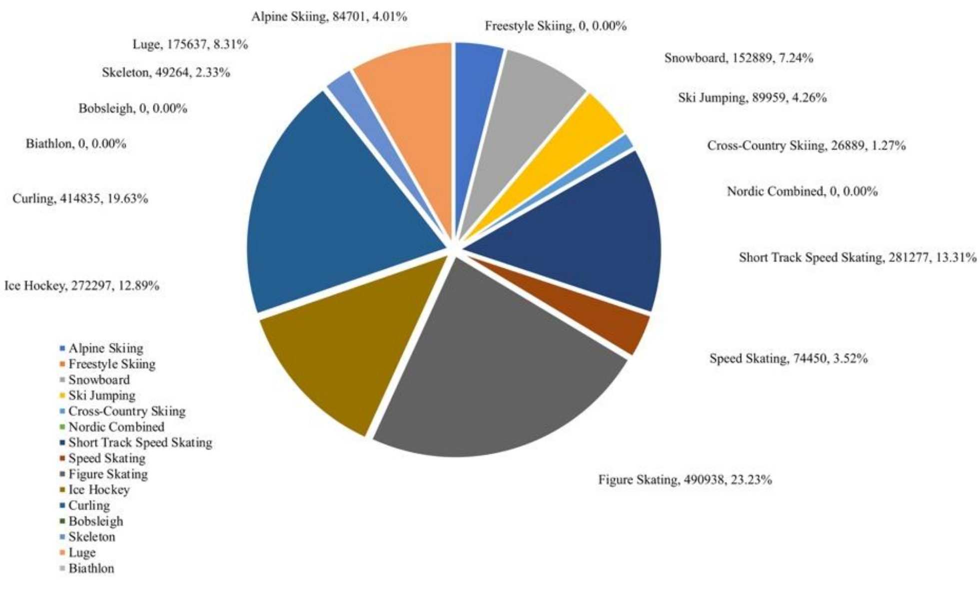


Figure 4. *Geographic Distributions of Chinese Winter Sports Enthusiasts in the Pre-Games Phase*

In the process of expanding the scale of winter sports from north to south, China reported that the combination of training and education has been another critical enabler of Chinese winter sports participation (BOCWOG & Beijing Sports University, 2022). Table 1 depicts that the number of skiers and children participating in ice and snow sports training was higher in the 2020/21 season than in the 2014/15 season. In the 2014/15 season, 11.95 million Chinese people (8.57% of China's total population; United Nations, n.d.) participated in skiing activities. This number reached 20.76 million in the 2020/21 season, accounting for 14.56% of the Chinese population. The maximum penetration rate was found in the 2020/21 season, after the sudden drop in the 2019/20 season, which saw a loss of 10.45 million skiers.

Table 1. *Total Number of Participants in Different Types of Ice and Snow Sports in China*

Season	Total Number of Skiers in China	Total Number of Chinese Kids Participating in Ice and Snow Sports` Training	Total Number of Youth Ice Hockey Players in Beijing
2014/15	11`950`000	2`410`000	1`205
2015/16	14`450`000	2`460`000	1`545
2016/17	16`900`000	2`540`000	2`350
2017/18	19`150`000	2`630`000	2`619
2018/19	20`600`000	2`700`000	3`308
2019/20	10`450`000	2`740`000	3`701
2020/21	20`760`000	2`780`000	3`127

Note. Each season is divided based on the fiscal year of Chinese ice and snow sports industry, which begins from 1. May of the same year and ends on 30. Apr. the next year.
Source: Statista (W. Zhang, 2023), Legacy Case Studies (BOCWOG & Beijing Sports University, 2022) and Forward the Economist (Forward the Economist, 2022).

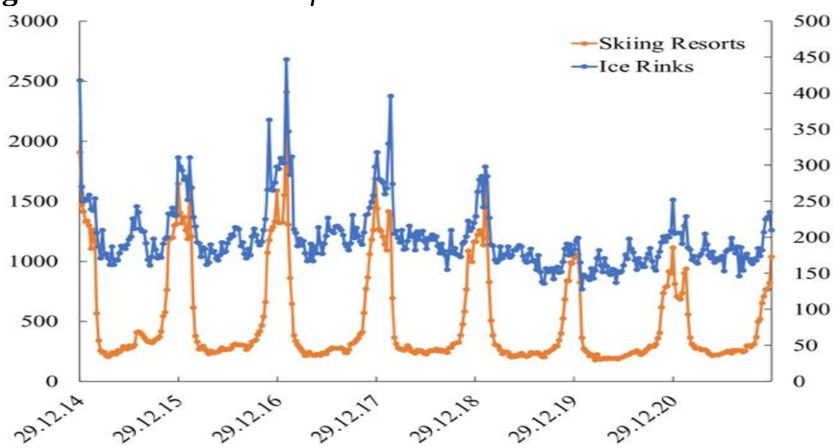
In contrast to the number of skiers, the number of Chinese children participating in ice and snow sports training increased steadily from 2.41 million in the 2014/15 season to 2.78 million in the 2020/21 season. The penetration rate followed the same trend, increasing from 1.73% to 1.95% of the Chinese population (United Nations, n.d.). The ice and snow sports training market for Chinese children grew relatively rapidly in the 2015/16 and 2016/17 seasons, with an average annual growth rate of 3.40%. However, the market growth slowed down from the 2018/19 season to the 2020/ 21 season.

In addition to skiing, the promotion of youth ice hockey has been seen as a significant achievement in sports participation. In the 2014/15 season, the number of youth ice hockey players in Beijing reached a record high of 1205. This number continued to rise and tripled by the 2019/20 season. After a sudden drop in the 2020/21 season, Beijing youth ice hockey continued to grow and evolve (BOCWOG & Beijing Sports University, 2022). Furthermore, the results also show the growth of children participating in ice and snow sports training across China is related to the expansion of youth ice hockey in Beijing.

Facilities & Equipment

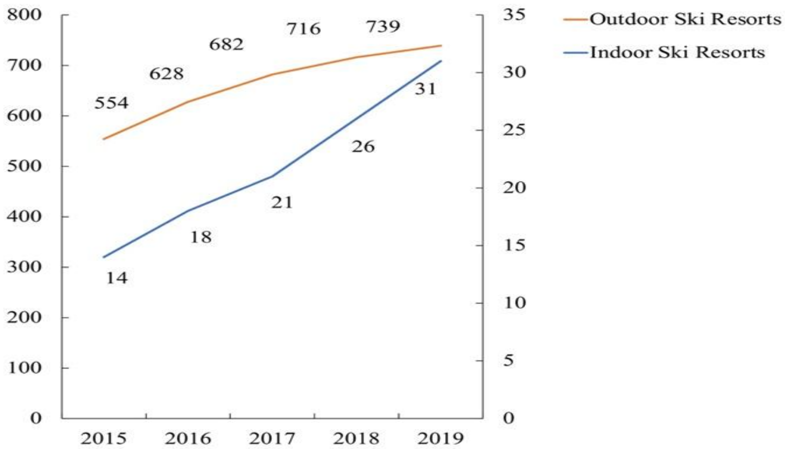
Figure 5 displays the pattern of Chinese netizens` behavior change in terms of searching ice rinks and skiing resorts. From 2015 to 2021, the high volume of searching appears in the period starting from October the previous year to February the following year. Compare with ice rinks, Chinese netizens paid less attention to skiing resorts, where seasonal volatile is more obvious. And the gaps between ice rinks and skiing resorts remain at the same level in the pre-Game period.

Figure 5. *Search Volume of Ice Rinks and Snow Resorts in Baidu*



By 2022, the number of ice skating venues and skiing fields in China had reached 2,261 (W. Zhang, 2023), 2.23 times more than that in 2015. Although annual statistics on all ice and snow sports venues in China are not available, the data we collected shows that the number of ski resorts increased from 568 in the 2015 season to 770 in the 2019 season. The growing tendency of indoor and outdoor ski resorts are similar. The average growth rate of indoor ski resorts was 22.07%, and the average growth rate of outdoor ski resorts was 7.54% (see Figure 6).

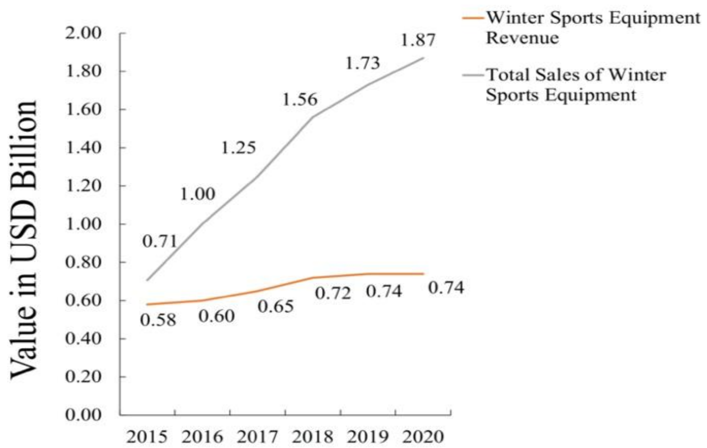
Figure 6. *Number of Outdoor and Indoor Ski Resorts in China from 2015 to 2019*



Source: Forward the Economist (Forward the Economist, 2022).

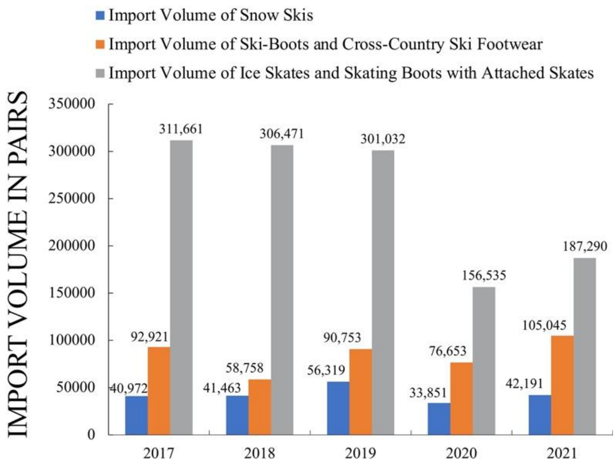
From a winter sports equipment perspective, our analysis results showed that the gap between total sales and revenue widened each year from 2015 to 2020. The winter sports equipment market expanded, but the growth rate slowed down after 2017. Meanwhile, revenue from winter sports equipment grew marginally from 2015 to 2020 (see Figure 7). There is a strong positive correlation between total sales and revenue of winter sports equipment.

Figure 7. *Total Sales and Revenue of Winter Sports Equipment in China from 2015 to 2020*



To compare the growth of ice and snow sports, we examined the volatile changes in the import volume of skis, ski footwear, and ice skates from 2017 to 2021. Despite the decrease in 2020, the import volume of ice skates and skating boots was higher than that of snow skis and boots. In contrast, the import volume of snow skis and boots showed an increasing trend with volatility (see Figure 8). However, the enlargements of the import volume are not correlated, judging from the graphic.

Figure 8. *Import Volume of Skis and Ice Skates in China from 2017 to 2021*



Source: Statista (W. Zhang, 2023).

Market Power of the Chinese Winter Sports Industry

Based on government policies and plans, the Chinese winter sports market covers three sectors: design and equipment, operation and services, and final consumption (Interesse, 2023). The market size is calculated by the total sales of all three sectors related to winter sports activities.

In 2015, the total sales of Chinese winter sports were CNY 27 billion. This number reached CNY 48.75 billion in 2019, but fell to CNY 44.52 billion in 2020 due to the impact of COVID-19. The skiing industry has shown similar growth trends. The market size of the Chinese skiing industry includes operating income, sales of skiing clothing and equipment, investment in ski resort construction, and investment in skiing training (MobTech, 2020). In 2015, the market size was CNY 12.75 billion. After hitting a record of CNY 26.75 billion in 2019, the total sales dropped 16.86% in 2020.

Winter sports training and competitions/events have had a clear leveraging effect in motivating more Chinese people to participate in winter sports, according to IOC legacy reports. The skiing training market witnessed rapid growth from 2015 to 2020. In 2015, the size of the skiing training market was CNY 5.01 billion, which had increased by 1.38 times by 2020 (see Figure 9). Moreover, the results also confirmed that skiing training and skiing competitions/events advanced the Chinese skiing industry and created one of the world's largest beginner markets.

Regarding the leverage effects of popular Chinese winter sports events, Table 2 reveals that the amounts of events within the flagship program "National Public Ice and Snow Season" increased in general, despite the collision of the COVID-19 pandemic. From 2015 to 2021, over 1,000 competitions and events were organized annually. These events, exemplified by names such as the "National Public Ice and Snow Season," "Red Bull Nanshan Open," and "Harbin Ice Festival," attracted nearly

100 million individuals, both directly and indirectly, into the fold of winter sports (BOCWOG & Beijing Sports University, 2022).

Figure 9. *The Market Growth of Chinese Winter Sports from 2015 to 2020*

Source: Statista (W. Zhang, 2023).

Table 2. *Details of Chinese National Public Ice and Snow Season*

Year		Place of Launching Ceremony	Number of Events Held	Number of Provinces, Autonomous Regions and Municipalities Involved	Number of Participants
1st	2014	Beijing	80	10	Around 10 million
2nd	2015	Beijing	100+	15	Around 15 million
3rd	2016	Beijing	100+	25	30 million
4th	2017	Shijiazhuang	1,000+	25	50 million
5th	2018	Shanghai	1,500+	27	90 million
6th	2019	Tianjin	800 (most planned events were not held due to the pandemic)	27	70 million
7th	2020	Changchun	1,200 (less events were held due to the pandemic)	31	Nearly 100 million

Source: Legacy case studies: Olympic and Paralympic Winter Games Beijing 2022 (BOCWOG & Beijing Sports University, 2022).

Discussion

The Leverage Effects of Sports Policy and Economic Progression

The findings presented in this paper provide preliminary evidence that Beijing 2022 has played a pivotal role in increasing the engagement of the host population in winter sports participation in the period leading to the Games. The Baidu index revealed that most Chinese pay great attention to the Olympic Games at game time, partially confirming the demonstration effect of elite sports events in China. Moreover, both our data and Beijing 2022 Pre-Games Sustainability Report highlighted that in the period 2015-2021 mass participation in winter sports flourished. Chinese winter sports participation widened considerably from 2016 to 2018, while another fast growth appeared one year ahead of the 2022 Beijing Games. Although attitude and behavior changes are often intertwined, our results haven`t demonstrated a significant correlation between the search volume and the visits to ice rinks and skiing resorts in China.

Regarding the geographic location of Chinese netizens who searched for ice rinks and skiing resorts, we diagnosed that there was a high percentage of people coming from the provinces with economic progression, such as Jiangsu, Shandong, and Zhejiang besides those provinces appointed with winter sports development tasks, for instance, Beijing, Guangdong, and Hebei. Meanwhile, some traditional winter sports provinces, for example, Hei Longjiang, Jilin, and Liaoning reported a great number of winter sports participation, whilst holding a relatively low Baidu index. From the dimension of winter sports discipline, our results revealed that medal-winning disciplines and popular sports, such as skiing and snowboarding, drew lots of attention from Chinese internet users. The demonstration effect of elite sports success could be one of the reasons. Other factors may involve social identity, exclusivity, learning enthusiasm, and so on. Referring to sports policies and the relevant guidelines, such as the Ice and Snow Sports Development Plan 2016-2025 and the Mass Winter Sports Promotion and Popularization Plan 2016-2020 (Interesse, 2023) that served as a solid foundation for the growth of winter sports in China, we diagnosed multi-level and purposive policy-driven features of the increment. This positive outcome can be attributed to a multifaceted approach that combines effective policy strategies and targeted initiatives.

Moreover, the disconnection between attitude and behavior changes may be attributed to the Chinese sports system, consumption habits, and diverse models of Chinese winter sports development in the selected region. Corresponding to the "Juguo Tizhi" characterized by the "Top-down" mechanism, the "bottom-up" approach stimulated facilities development, talent identification, and social advancement in the non-traditional winter sports regions.

Provision of Facilities Accompanying the Integration of Sport and Education

Our results strengthened the argument that sports education and training emerged as a critical factor in fostering a culture of winter sports participation among the younger generation. This integration extends beyond theoretical classroom sessions, encompassing practical hands-on experiences. Elementary, middle, and high schools acted as beacons for young talents` development. Universities have played a determining role in popularizing winter sports and fostering sustainable development by nurturing winter sports instructors, basic-level trainers, volunteers, and various other types of talent essential to the sport. The resulting program has laid the foundation for a sustainable, cyclical winter sports heuristic system, whose resilience has been exemplified amidst the challenges posed by the COVID-19 pandemic.

This promotion strategy is a tangible element of the broader social context that influences individuals' understanding and engagement with winter sports, aligning with the artifactual layer's focus on formal structures and policies by integrating winter sports into the curriculum and offering accessible training opportunities, this approach not only introduced a vast number of students to winter sports but also ensured their continued involvement beyond the Games.

Accompanying the soft-power building program, the proliferation of winter sports facilities nationwide has played a pivotal role in popularizing ice and snow sports in China. From 2015 to 2022, the number of ice and snow sports venues increased by 1.43 times. Notably, our results demonstrate a significant difference in the growth of outdoor and indoor ski resorts. And the winter sports participation rate largely depends on the geographical distribution of the venues, in terms of southern-northern China (GAS, 2022). Furthermore, our research has established clear reciprocity between the growth in the number of Chinese children participating in ice and snow sports training and the rapid construction of ski resorts, regardless of their types.

Given its substantial infrastructure requirements, skiing was less prevalent in many regions of China compared to ice sports. As a result, ice rinks attracted more public attention than skiing resorts in general, and the expansion of ski resorts emerged as a sensitive indicator to gauge market trends. Our findings reveal that the growth in the number of ski resorts reached its peak (exceeding 10%) between 2015 and 2016, driven by winter sports-friendly policies and a surge in participation. While outdoor ski resorts remained predominant in China, the development of indoor ski resorts has been instrumental, particularly in non-traditional winter sports provinces and cities lacking natural snow, in fulfilling sports policy objectives and realizing participation goals.

Besides government policies and cultural factors, conditional change (such as increasing health consciousness triggered by the COVID-19 pandemic) contributes to the extension of mass participation and influences consumption behaviors. The successful bid for Beijing 2022 initially prompted a surge in the import of ice and snow sports equipment. The fluctuation in the import volume of items such as skis, ski footwear, and ice skates reflects customer preferences for ice and snow sports equipment with foreign brand names. The rise of Chinese domestic products and advancements in related technologies have reshaped the market landscape and altered revenue distribution. Furthermore, the rapid rebound observed after 2020 could be linked to two driving factors within the Chinese winter sports industry—first, the phenomenon of "revenge consumption," (Hong & Oh, 2021) which signifies rapid economic progress driven by psychological and emotional factors following a period of stagnation consumption, and second, government-led initiatives in the market.

The Vast Novice Sports Market and Stakeholder Alliance

The growth of participants per year in different ice and snow sports and the increase in the market for Chinese winter sports indicate that China is becoming a vast novice winter sports market. From 2015 to 2021, the amounts of visits doubled while the size of the Chinese winter sports industry grew 181%. The speed of augmentation attracted lots of queries about the number and mechanisms.

Referring to the official legacy report, the stakeholders involved in Beijing 2022, including BOCWOG, host governments, sports organizations, media and social media outlets, a wide array of sponsors and suppliers from different sectors, and local communities (Ferkins & Shilbury, 2015; Naraine et al., 2016; Oh et al., 2018), managed to collaborate closely with a shared vision: `Motivate 300 million people in winter sports` (Beijing 2022 Olympic Winter Games Bid Committee, 2014). This collaborative mechanism can be delineated as a multi-centric network, underpinned by the principle of equal stakeholder responsibilities and rights (Q. Zhang et al., 2023). Besides the formal structure, the autonomous collaboration among stakeholders often took place through various training programs, and the hosting of events and competitions, infused with the cultural values and beliefs of local communities.

Our results suggested that government policies and formal structures have a great impact on shaping the collaborative landscape and creating an effective mechanism to balance organizational interests and demands. However, there`s still limited information about whether the collaborative efforts among stakeholders encountered challenges in conjunction with goal alignment, strategies, and specific tactics (Chalip et al., 2017), as well as with which methods Chinese organizers resolved the conflicts.

Limitations and Directions for Future Research

In assessing the promise to engage 300 million people in winter sports through the Beijing 2022 Winter Games, our study analysed a wide range of secondary quantitative data. This approach offered several advantages and limitations. Utilizing secondary data allowed us to access a wealth of information on participation rates, infrastructure facilities development, and government initiatives, enabling a comprehensive evaluation. It also facilitated the analysis of trends and changes over a seventh time period, which provided insights into the effectiveness of various strategies employed. However, the use of secondary data poses challenges, including different conceptualizations, potential data quality issues, inconsistencies across sources, and the inability to capture nuanced aspects of individual experiences. Furthermore, establishing causality in our study remains a challenge, despite that the validity and reliability of the official data provided by the Chinese government and the selected research institutes/commercial organizations are interdependent, convergent, and complementary.

While the Beijing 2022 Winter Games undoubtedly played a significant role in promoting winter sports, numerous confounding factors could influence participation rates. Socioeconomic variables, regional disparities, cultural preferences, and the presence of other sporting events or initiatives could all impact engagement in winter sports. Additionally, our study focused mainly on the phase leading up to the Games and this makes it difficult to ascertain the long-term effects. This temporal lag between the event and the realization of its impact legacy makes it challenging to assess the effectiveness of initiatives aimed at promoting a durable sports engagement. To address these complexities, future research should incorporate qualitative data and conduct in-depth interviews or surveys to gain a deeper understanding of individuals' motivations and experiences, thereby shedding more light on the cultural and societal factors that might have played a crucial role in shaping sport participation patterns.

Conclusion and Practical Applications

This paper represents one of the pioneering studies that has undertaken a comprehensive and extensive analysis of a carefully selected set of quantitative indicators in alignment with triangulation. Meanwhile, this investigation provided references to understand the complex nature of winter sports participation legacy. Our objective has been to shed light on various dimensions, including the perspectives of individuals, facilities, equipment, and the market, to closely monitor progress toward the targeted sport participation goal. We anticipate that this study will make a valuable contribution towards addressing the challenges posed by the broad and ambitious nature of Beijing 2022's goal, which seeks to inspire 300 million people to engage in winter sports.

In our pursuit of a suitable methodology to bridge the existing research gap in assessing the achievement of engaging 300 million Chinese in winter sports, which has been treated as a numerical target by a substantial proportion of scholars, our study has contributed significantly by employing a wide array of indicators and comprehensive longitudinal data. The secondary data originate from both national and international sources, including reputable organizations such as BOCWOG, IOC, and GAS. In addition, it should be noted that our study not only includes data from sources that can be considerably challenging for Western academics to access, as they are primarily rooted in the Chinese language or domain. Thus, this research endeavor has yielded critical insights, not only shedding light on the success of the sport participation legacy but also serving as a source of inspiration for future investigations on a global scale into the strategic planning and implementation of legacy programs and their facilitators. Regarding transformative strategies, our study has identified three crucial mechanisms that stakeholders leveraged to realize the sport participation goal. These mechanisms include "Leveraging sports policy", "Provision of facilities accompanying the integration of sport and education", and "Cooperative stakeholders` alliance strengthened by media power and technology".

In conclusion, our comprehensive investigation highlights that evaluating the legacy of the Beijing Winter Olympics necessitates an understanding of systemic context, culture norms and methodologies. It is worth further investigation to assess if the transformative strategies are acquisitive and could maintain the sport participation legacies after the Games.

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No potential conflict of interest was reported by the author(s). And there is non-financial interest that has arisen from the direct applications of your research.

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Data Availability Statement

The data presented in this study is available on request from the corresponding author.

References

Beijing 2022 Olympic Winter Games Bid Committee (2014). *Beijing 2022 candidate city* (Beijing). https://library.olympics.com/Default/doc/SYRACUSE/1447549/beijing-2022-candidate-city-beijing-2022-olympic-winter-games-bid-committee

BOCWOG, & Beijing Sports University (2022) *Legacy case studies: Olympic and Paralympic Winter Games Beijing 2022*. https://library.olympics.com/Default/doc/SYRACUSE/1568409/legacy-case-studies-olympic-and-paralympic-winter-games-beijing-2022-beijing-organising-committee-fo

BOCWOG, Beijing Sports University, & Centre for Olympic Studies (2021) *Legacy report of Olympic and Paralympic Winter Games: Beijing 2022 (pre-Games)* (Beijing). https://library.olympics.com/Default/doc/SYRACUSE/734943/legacy-report-of-olympic-and-paralympic-winter-games-beijing-2022-pre-games-beijing-organising-commi?lg=en-GB

Breuer C, Hallmann K, Wicker P (2011) Determinants of sport participation in different sports. *Managing Leisure*, *16*(4), 269–286. https://doi.org/10.1080/13606719.2011.613625

Byers T, Hayday E, Pappous A (2019) A new conceptualization of mega sports event legacy delivery: Wicked problems and critical realist solution. *Sport Management Review*, *23*(2), 171–182. https://doi.org/10.1016/j.smr.2019.04.001

Chalip L, Green BC, Taks M, Misener L (2017) Creating sport participation from sport events: Making it happen. *International Journal of Sport Policy and Politics*, *9*(2), 257–276. https://doi.org/10.1080/19406940.2016.1257496

Chen S, Xing X, Chalip L (2022) Planning and implementation of event leveraging strategy: China's legacy pledge to motivate 300 million people to be involved in winter sport. *Sport Management Review*, *25*(5), 771–790. https://doi.org/10.1080/14413523.2021.1987737

Downward P, Riordan J (2007) Social Interactions and the Demand for Sport: An Economic Analysis. *Contemporary Economic Policy*, *25*(4), 518–537. https://doi.org/10.1111/j.1465-7287.2007.00071.x

England S (2022) *Active Lives Adult Survey November 2020-21 Report* (p. 5). Sport England: London, UK. https://sportengland-production-files.s3.eu-west-2.amazonaws.com/s3fs-public/2022-04/Active%20Lives%20Adult%20Survey%20November%2020-21%20Report.pdf?VersionId=nPU_v3jFjwG8o_xnv62FcKOdEiVmRWCb

Ferkins L, Shilbury D (2015) The Stakeholder Dilemma in Sport Governance: Toward the Notion of "Stakeowner." *Journal of Sport Management*, *29*(1), 93–108. https://doi.org/10.1123/JSM.2013-0182

Forward the Economist (2022) *The 2022 report on trend development of China`s snow and ice industry*. Forward the Economist. https://www.qianzhan.com/analyst/detail/220/230316-c2a03a4b.html

GAS (2016) *Plan for Popularising Mass Winter Sports (2016-2020)*. https://www.gov.cn/xinwen/2016-11/25/content_5137611.htm

GAS (2022) *Survey Results of "Motivate 300 million people to engage in winter sports."* https://www.sport.gov.cn/n20001280/n20001265/n20067533/c23922073/content.html

Gau L-S, Duong PT, Kim, J.-C. (2022). Parallel Leisure Sport Activities Diversity with Economic, Social and Human Development Indicators. *Social Indicators Research*, *164*(3), 1403–1425. https://doi.org/10.1007/s11205-022-02997-4

Hindson A, Gidlow B, Peebles C (1994) The trickledown effect of top-level sport: Myth or reality? A case study of the Olympics. *Australian Journal of Leisure and Recreation*, *4*(1), 16–24.

Hogan K, Norton K (2000) The 'Price' of olympic gold. *Journal of Science and Medicine in Sport*, *3*(2), 203–218. https://doi.org/10.1016/S1440-2440(00)80082-1

Hong S-M, Oh J-R (2021) A Study on the Consumer's Unreasonable Consciousness in the Event of Corona 19 Infectious Disease Crisis. *Annals of the Romanian Society for Cell Biology*, 927–936.

Humphreys BR, Ruseski J (2009) *The economics of participation and time spent in physical activity*. *No. 2009-9*.

Interesse G (2023, January 26) *China's Winter Sports Market: Outlook and Opportunities*. China Briefing. https://www.china-briefing.com/news/chinas-winter-sports-market-outlook-and-opportunities/

IOC (2021) *IOC Session approves Olympic Agenda 2020+5 as the strategic roadmap to 2025*. https://olympics.com/ioc/news/ioc-session-approves-olympic-agenda-2020-5-as-the-strategic-roadmap-to-2025

Kim C, Kaplanidou K (2024). The Effect of Sport Involvement on Support for Mega Sport Events: Why Does It Matter. *Sustainability*, *11*(20), 5687. https://doi.org/10.3390/su11205687

Leslie E, Cerin E, Gore CJ, George AS, Bauman A, Owen N (2004) Gender, Age, and Educational-Attainment Differences in Australian Adults' Participation in Vigorous Sporting and Fitness Activities. *Journal of Physical Activity and Health*, *1*(4), 377–388. https://doi.org/10.1123/jpah.1.4.377

Mair J, Smith A (2021) Events and sustainability: Why making events more sustainable is not enough. *Journal of Sustainable Tourism*, *29*(11–12), 1739–1755. https://doi.org/10.1080/09669582.2021.1942480

MobTech (2020) *White Book of Chinese Ski Industry*. https://www.sgpjbg.com/

Naraine ML, Schenk J, Parent MM (2016) Coordination in International and Domestic Sports Events: Examining Stakeholder Network Governance. *Journal of Sport Management*, *30*(5), 521–537. https://doi.org/10.1123/jsm.2015-0273

Oh T, Oh J, Kim J, Kwon KD (2018) Differences of perception between private and public officers in an organizing committee concerning stakeholders of an international sporting event. *International Journal of Sports Marketing and Sponsorship*, *20*(1), 127–142. https://doi.org/10.1108/IJSMS-08-2017-0067

Pappous A (Sakis), Hayday EJ (2016) A case study investigating the impact of the London 2012 Olympic and Paralympic Games on participation in two non-traditional English sports, Judo and Fencing. *Leisure Studies*, *35*(5), 668–684.

Ribeiro T, Calapez A, Almeida VMC de (2022) Does the Olympic legacy and sport participation influence resident support for future events? *Leisure Studies*, *41*(4), 471–486. https://doi.org/10.1080/02614367.2021.2011951

Scheerder J, Vandermeerschen H, Van Tuyckom C, Hoekman R, Breedveld K, Vos, S (2011) Understanding the game: Sport participation in Europe: Facts, reflections and recommendations. *SPORT, POLICY & MANAGEMENT (SPM)*, *10*. https://biblio.ugent.be/publication/1932490/file/1932507

Shi P, Bairner A (2022) Sustainable Development of Olympic Sport Participation Legacy: A Scoping Review Based on the PAGER Framework. *Sustainability*, *14*(13), Article 13. https://doi.org/10.3390/su14138056

Sports Science Research Center (2022) *National Fitness and Physical Activity Status Survey in 2020*. GAS: Beijing, China. https://www.sport.gov.cn/n315/n329/c24335053/content.html

United Nations (n.d.) *China Population 1950-2023*. Macrotrends. Retrieved April 4, 2023, from https://www.macrotrends.net/countries/CHN/china/population

Weed M, Coren E, Fiore J, Wellard I, Chatziefstathiou D, Mansfield L, Dowse S (2015) The Olympic Games and raising sport participation: A systematic review of evidence and an interrogation of policy for a demonstration effect. *European Sport Management Quarterly*, *15*(2), 195–226. https://doi.org/10.1080/16184742.2014.998 695

Wicker P, Hallmann K, Breuer C (2013) Analyzing the impact of sport infrastructure on sport participation using geo-coded data: Evidence from multi-level models. *Sport Management Review*, *16*(1), 54–67. https://doi.org/10.1016/j.smr.2012.05.001

Worldbank (2021) *GDP (current US$)—China | Data*. Worldbank. https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=CN

Zhang Q, Kim K (Anthony), Nauright J, Zhang JJ (2023) Stakeholders in venues of the 2022 Beijing Winter Olympic Games: A critical analysis. *Sport in Society*. https://www.tandfonline.com/doi/abs/10.1080/17430437.2023.2202152

Zhang W (2023) *Winter sports in China* [Dataset]. https://www.statista.com/topics/10309/winter-sports-in-china/