



Research on the Sustainable Development of Post-Olympic Cultural Tourism Heritage: Focusing on Venue Reuse

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SUMMARY: *Winter Olympic Games as an international sporting event to host cities, after the games, it has to face the social issue of utilising infrastructure and facilities to promote cultural tourism. This research aims to understand how cultural tourism can be sustainably developed while using Winter Olympism to analyse venue reuse as the central theme. Analysing the data from foreign and domestic studies, the research uncovers such advantages of venue reuse as the creation of employment opportunities, touristic appeal, and local consumption promotion. The specified study also briefly discusses the environmental impacts of efficiency enhancement through reviving existing structures without new constructions and the resultant carbon emissions. The role of combining cultural activities with tourism resources also highlighted the co-stimulation of consumers' attraction and the local economy. Additionally, the study discusses the need to activate the policy environment and the proper functioning of market relations to successfully restore and reuse Olympic facilities, highlighting the need for proper planning and public participation. The results contribute to the knowledge of current and standard practice issues in partnership with the private sector, multi-functional transformation, and digital solutions in the reuse of venues, identifying theoretical and practical implications for future sustainable cultural tourism development. Thus, the findings of this thesis enhance knowledge concerning post-Olympic urban legacy management and provide valuable insights to policy-makers and practitioners.*

KEYWORDS: *Winter Olympic Games, cultural tourism, venue reuse, sustainable development, economic benefits, policy support*

1 Introduction

The Winter Olympic Games are an important annual sporting event that involves athletes and people from different parts of the world; hence, the social impact on the host cities is enormous [1, 2]. Although the main focus is on the sports competitions themselves, their completion is followed by significant problems and opportunities, mainly concerning the post-event utilisation of venues and assets. Exemplary sporting facilities are developed within the host city as embracing infrastructure for the games; thus, the challenge arising from the failure of converting such important infrastructure after the end of the games is how they can be employed to contribute towards sustainable culture and tourism development [3]. Solving these problems is critical for achieving the lasting impact of the investment made on the remainder of the Olympics and the further growth of the economics and demographics of regions that host these games.

Winter Olympic legacy refers to organising games' tangible and intangible assets that are

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created for continued use. These are the sports facilities, infrastructural developments, and intangible aspects of culture created by the event [4]. This means that the heritage of the Winter Olympic Games has focused on the seasonal aspect, uniqueness of the sporting facilities, and incorporation of winter sports into the city. There are satisfactions and frustrations with these characteristics regarding post-event utilisation since the venues have to be converted to new use appropriate to the locality and its sustainable development needs [5]. This study seeks to understand the sustainable purpose and use of the post-Olympic cultural tourism heritage with a special emphasis on the facilities during and after the Olympics. Thus,

By examining venue reuse's contribution, the study aims to reveal the benchmarks and best practices that would enhance sustainable cultural tourism. The work will be carried out in an academic third-person tone, and the case analysis results and empirical data will offer theoretical concepts and real-life advice. Lastly, this research aims to integrate into the existing literature topics about the future utilisation of Olympic legacies that would promote sustained cultural tourism for the growth of communities in host cities.

2 Literature Review

2.1 International Experience in Post-Race Legacy Utilization

Fusing and managing facilities after the Olympic event have been deemed an imperative function of sustainable development and have been targeted during international programs. For example, the conversion of the Olympic Complex of Barcelona into parks, museums and residential estates during the Olympic Games of 1992 is a common example of post-Olympic city reuse that is quick to surface [6]. Similarly, it is worth noting that the new sustainable sites for recreation and tourism, especially the Olympic Park in Sydney 2000 Olympics, which is used nowadays for hosting major events for citizens and as a recreation area, may also be used as significant examples of establishing multi-functional spaces for the citizens and tourists.

On the other hand, some host cities have experienced big problems. For instance, most of the Athens 2004 Olympic venue infrastructures have remained dormant and dilapidated because of poor planning on utilising these structures after the event and massively high maintenance costs [7].

Sustainability in the context of post-game facility utilisation can be illustrated through the Beijing 2022 Winter Olympics case. The Beijing Organising Committee for the 2022 Olympics and

Paralympic Winter Games (2022) asserted that nine out of forty-one venues were developed from Beijing 2008 Summer Olympics facilities; this suggests a systematic procedure to optimise utilising existing resources. It not only achieved the minimisation of the negative effects of the construction of new facilities but also maintained durable utilisation with multiple purposes such as sports, cultural experiences, and tourism [8].

However, not all these Winter Olympics have recorded a similar success in the post-race utilisation of the venues. For instance, the Sochi 2014 Winter Olympics received a lot of criticism mainly due to the destruction of the environment when setting up facilities in a world heritage site and, later, the neglect of most of the installations. The PyeongChang 2018 Winter Olympics also faced pros and emblems, including high costs and lack of long-term utilisation of some of the developed infrastructures, such as game game venues.

There is also the fact that sustainable land use for Olympic venues is highlighted in the UN Sustainable Development Goals, advocating for sustainable land management practices worldwide. The dynamics of legacy management after the Beijing 2022 Winter Olympics can also be considered more sustainable in terms of environmental protection and maintenance of

ecosystems [9]. This generally shows the model of post-race utilisation of other venues constructed for the Beijing 2008 Olympics, such as the National Stadium and the Wukesong Sports Centre, among others. Table 1 shows a comparison table of international Winter Olympics venue reuse cases.

Table 1: Comparison of International Winter Olympics Venue Reuse Cases

City	Year	venue name	Reuse mode	Success factors
Barcelona	1992	Olympic complex	Parks, museums, and residences	Early planning, multifunctional design, sustainable design, lack of policy support for later planning, high maintenance costs
Sydney	2000	Olympic Park	Large scale events and leisure areas	Environmental disputes and improper site selection
Athens	2004	Most venues	Idle and abandoned	Insufficient utilization after the competition, single functionality, renovation of existing facilities, and policy support
Pyeongchang	2014	Alpine Ski Center	Destruction and abandonment of World Heritage sites	Success factors
city	2018	Some venues	Idle, high cost	Early planning, multifunctional design, sustainable design, lack of policy support for later planning, high maintenance costs
Barcelona	2022	National Stadium, Wukesong Sports Center	Ice hockey games and multifunctional activities	Environmental disputes and improper site selection

2.2 Research on Sustainable Development of Cultural Tourism

As a concept, sustainability in cultural tourism is a function of economic development while ensuring positive impacts are generated on cultural and natural assets. According to the findings of Reference [10], cultural tourism entails the protection of cultural heritage as well as

Promoting the economic advantages of destination communities. This approach entails extensive planning so as not to encourage the eventual deterioration of culture or destruction of natural resources.

Historical and cultural site conservation has been indicated as one of the best approaches towards sustainable cultural tourism. According to Reference [11], the process of transmuting historical facilities into visitor' attractions might create distinct tourist services while preserving historical spaces. Also, cultural events and festivals, when incorporated into tourism development strategies, have been seen to improve the image of and practice sustainable measures on the destination.

Thus, cultural tourism, mentioned by Reference [12], presents a curious approach to maintaining and developing the sustainability of destinations using historical and cultural potential. This strategy does not only branch out cultural appreciation but also guarantees that the ‘tourism impact’ is not destructive to the cultural heritage and people of the area. Reference [13] provide historical background on the origin of sustainability in preserving the environment and assimilating cultural aspects into the sustainable development process.

Reference [14] describes the evils and opportunities of mainstreaming culture and heritage in development paradigms. She is keen on calling for measures that guard cultural property and preserve cultural heritage as much as supporting tourism activities that can boost the people and, by extension, the economy of a locality. Similarly, Reference [15] posits that culture should be regarded as the fourth pillar of sustainable development, alongside the social, economic, and environmental dimensions. This perspective is reinforced by the United Cities and Local Governments (UCLG), which underscores the role of cultural heritage in achieving sustainable urban development.

2.3 Related Research on Venue Reuse and Cultural Tourism Development

The concept of venue reuse is crucial for the sustainable development of cultural tourism post-Olympics. Reference [16] discusses the broader implications of Olympic legacies, emphasising the need for venues to contribute to long-term social, cultural, and environmental goals.

Optimisation of venues after the Olympic Games can turn Olympic sites into cultural and tourism centres 10 years later, especially if considered from the perspective of post-Olympics – 2012, London’s Olympic Park before being dubbed a cultural and recreational landmark.

However, some of these challenges still sustain the economic feasibility of the design and cultural sensitivity of the idea. The best practices include major community and stakeholder participation, which guarantee that the developments are demanded and necessary for the given population. The involvement of policy support alongside market mechanisms is also noted as crucial for maintaining these programs.

The efficient utilisation of structures developed for Olympic functions is one of the crucial aspects of sustainable event management and utilisation of structures as it has the minimum negative impact on the environment and ensures that massive investments in constructions are given maximum returns in the future. Ideas such as the seventh turnaround or the eighth turn of the venues are not only economic solutions but also environmentally friendly concepts as well.

This practice was demonstrated when Beijing was chosen to host the 2022 Winter Olympics. The reuse of other venues used for the 2008 Summer Olympic Games and Paralympics, such as the National Indoor Stadium and Shougang Park, depicts a policy of utilising sustainable and efficient use of the available resources (Beijing Organising Committee for the 2022 Olympic and Paralympic Winter Games, 2022). The principles of sustainable development fully justify this approach as it eliminates the necessity of constructing new aggressive buildings and fully utilising existing facilities.

Artificial snow cover and other permanent structures, though, remain highly invasive and bring about extensive environmental impacts, as identified in the environmental impact assessments of the Winter Olympics. For instance, preparing for the Sochi 2014 Winter Olympics caused considerable harm to the ecological system of the Caucasus Nature Reserve.

Similar worries were voiced around the PyeongChang 2018 Winter Olympics; here, the construction of the alpine skiing centre at Mount Gariwang eradicated a 500-year-old forest.

3 The Challenges and Opportunities of Cultural Tourism Development after the Olympic Legacy

3.1 Challenges Facing the Utilisation of Venues after the Winter Olympic Legacy

(1) Operation Management Inefficiency and Cost Problems

This management research examines the occurrence of poor operational management and high operational costs that are major in the use of post-Olympic venues. The Beijing Olympics 2022, like any other Winter Olympics that seeks to borrow infrastructures from the Summer Olympics, incurred a number of costs in maintaining and adapting the facilities to multi-utilitarian use in cultural and sporting activities. Maintenance costs and operational issues related to managing such big facilities often result in low use and budget losses.

(2) The Difficulty of Venue Function Conversion and Reuse

Another problem is the conversion of the infrastructures that were constructed, especially for the Olympics, for different purposes. In contrast to the general-purpose sports complexes, most Olympic constructions are highly specialised and thus less flexible. For example, the facilities built for the Sochi 2014 Winter Olympics as well as the PyeongChang 2018 Winter Olympics have had major issues in sourcing appropriate post-games use, and thus, certain venues remain idle or underutilised inefficiently. This issue points to the fact that there is a need for proper planning and designing so that the venues can be easily rearranged with ease for other uses after the Games.

(3) Uncertainty about Market Demand and Participation

This last condition will always be accompanied by uncertainty about the market's demand and participation. This means that predicting the use of Olympic facilities after the Games is equally a thorny issue due to the uncertainty in future market demand and participation. Forecasting their sustainability and attractiveness over the years for cultural and tourism purposes is rather difficult.

When analyzing the economic benefits of reusing Olympic venues, a Cost Benefit Analysis (CBA) model can be introduced to quantify the net benefits of venue renovation. The formula is as follows:

$$NPV = \sum_{t=0}^n \frac{R_t - C_t}{(1+r)^t} \quad (1)$$

where, NPV stands for Net Present Value; R_t is the revenue of year t (such as ticket revenue, event rental revenue); C_t is the costs for the t -th year (such as maintenance and operating expenses); r is the discount rate; n is the analysis period (in years).

The 2016 Olympic Park garnered little interest, and economic activity over time contributed to the poor utilisation of the infrastructure, an aspect that actually led to losses. It is imperative that these venues have proper planning to attract consistent visitors and turnover and thus be viable economically.

3.2 Opportunities for Cultural Tourism Resources Development of Venues after the Olympic Heritage Games

(1) The Integration and Development of Culture and Sports Tourism

The Olympic Games, therefore, produce a culture and sports legacy that can be used to promote cultural tourism. This is because the Olympics are globally appreciated, and the

existing infrastructure within the city helps market the place as a cultural and sports tourism hub. For instance, Beijing has perfectly managed to incorporate the Olympic structures into the context of the overall cultural perspective where many new trends of modern Olympic sites and cultural heritage sites fit well together. This integration may draw a diverse crucian in tourism, thereby growing the local economy. The Olympic legacy often leaves host cities with a dual challenge: tourism is economic development for select regions while at the same time promoting the preservation of culture. Bearing this in mind, Reference [17] has pointed out that the adaptive reuse of heritage buildings may serve as the solution. Conservation of heritage does not only preserve important structures but also incorporates such structures in the modern city, thus giving practical uses. For instance, Fuwwah and Rosetta, cities in Egypt, are examples of the reuse of heritage buildings that harmonise competition and cultural memory.

(2) National Policy and Investment Support

Essentially, it is clear that national policies and investment measures are central to the sustainable development of cultural tourism in the post-Olympics period. Policies and

Government investments can contribute to the successful secondary use of Olympic structures. The benevolence of the Chinese government and policies also underpins the management of sustainable outcomes resulting from the Beijing 2022 Winter Olympics, inclusive of sizeable capital expenditure on green structures and sustainability-focused regulatory adjustments on tourism. Cultural tourism is noted to have some economically related benefits. However, these options should be viewed in terms of potential negative consequences such as over-commercialisation. Reference [18] underscored that community participation should be carried out in the conservation efforts so that the gains that accrue from commercial activities such as tourism will benefit the people. Many research works prove that measures like controlling the number of tourists and using the money generated through tourism to support other projects can improve the economic benefits associated with the preservation of heritage assets.

(3) New Technology Application and Innovative Business Models

The best opportunities concerning new technologies and the creation of new business forms could play an important part in developing cultural tourism based on Olympic facilities. One noteworthy point is that VR and AR may improve visitors' experience, thereby increasing the attractiveness of Olympic facilities to tourists. Furthermore, the successful strategies for managing such POINTS that have not been previously discussed are innovative business models and partnerships that can help establish community-based tourism. For instance, applying smart technologies to engage tourists' experiences at the Beijing Olympic venue (Beijing Organising Committee for the 2022 Olympic and Paralympic Winter Games, 2022)

4 Discussion on the Mode of Venue Reuse

4.1 Public-Private Partnership Model

Common and effective PPPs are normally within the context of sustainability, which involves reincorporating the Olympic venues. These partnerships leverage the strengths of both the public and private sectors: The public sector is supposed to ensure that the social and cultural aspects that were set down are all in order in the accomplishment of the goals, while the private sector has the aspects of efficiency, innovation, and capital. The flowchart of venue reuse mode is shown in Figure 1.

For example, the Beijing 2022 Winter Olympics Organization used the PPPs to manage the upkeep and change of their facility through the public sector subsidy, adding the flexible private sector operations. This made it possible to keep the usefulness of these areas on different

occasions, as well as their effectiveness and economic returns [19, 20]. Moreover, it engages private entities, which also brings new management methods in addition to the inflow of cash, which is a special factor in the conversion of such premises after the games.

However, the Wukesong Sports Centre, situated in Beijing, depicts the success stories of PPPs. Since the Games, the site's operations have been privatised with the help of PPPs; hence, the site has been open and versatile for all kinds of events other than Sports events. This kind of diversified use has ensured that the hall is active and helped the local economy and culture (Beijing Organising Committee for the 2022 Olympic and Paralympic Winter Games, 2022).

However, the following challenges are observed to affect PPPs as mentioned below. Concerns include the following: The first one is the conflict between partners and the public domain. We can, therefore, deduce that while the public sector contains entertainment for the delivery of social and cultural objectives, there is conflict as the private sector uses monetary objectives for profitability. In addition, issues related to contract sophistication and risk allocation imbalance within the partners' relationship also influence PPPs negatively.

For example, if the private partner's immediate organisational goals are financial, social objectives such as sustainability and conservation of the environment will not be given much attention, leading to poor utilisation and/or misuse of the venue. All these risks can be reduced when the governance authorities are rightly set and when the right documents/contracts and common goals are perfectly in tandem.

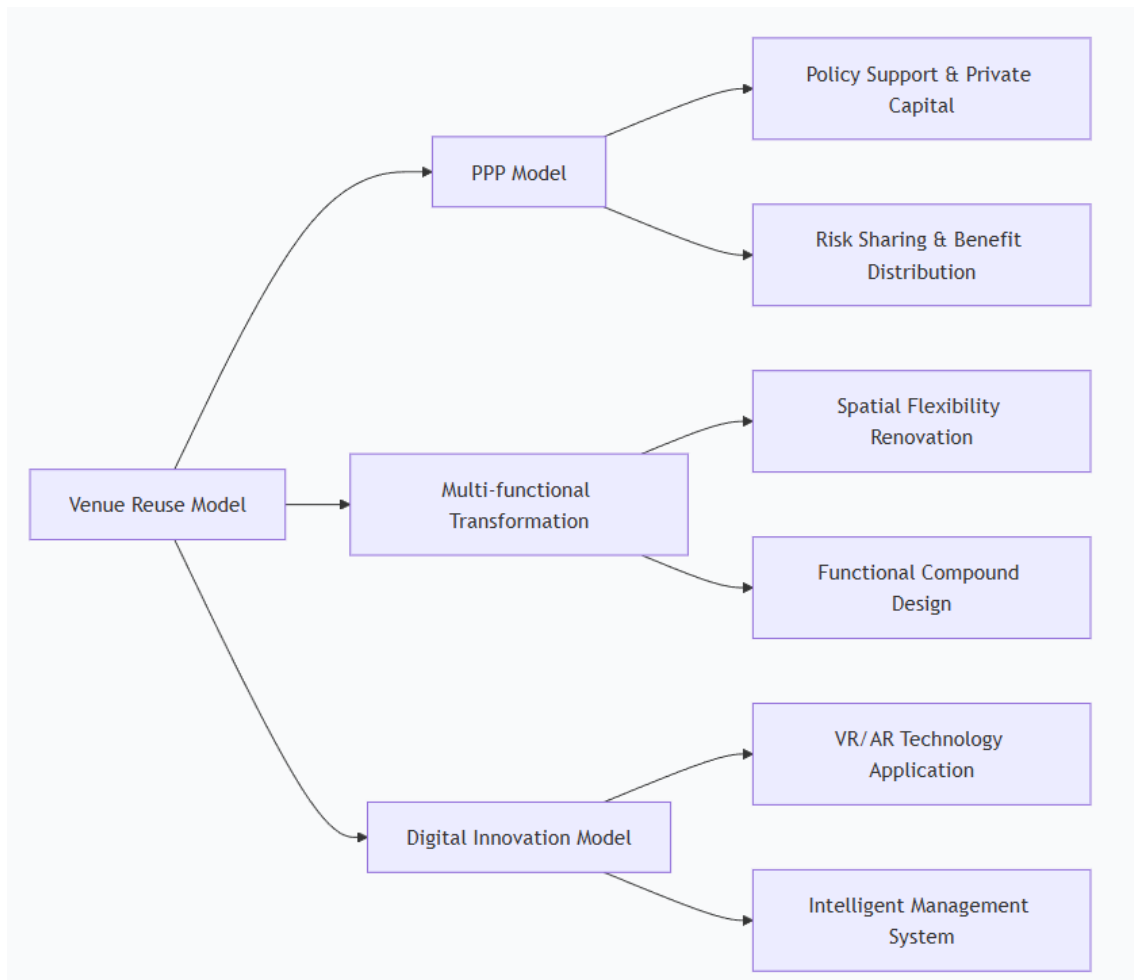


Figure 1: Flow Chart of Venue Reuse Mode

4.2 Venue Multi-Functional Transformation Mode

This strategy is used in Olympians with an adaptation of their multi purposes for the economic test of usage and/or importance. This entails architectural changes for ethnic, social, and sporting occasions and events. In particular, the goal is to apply the potentialities of architectural and constructive decisions in order to build spaces that may be monofunctional and ensure the greatest value and sparing use of the building.

For example, the flexibility element is incorporated into the venues for the performing of the winter sports event aspect in reference to the Beijing 2022 Winter Olympics design and other usages throughout the year. Apart from that, even the functional transformations of the spaces are quite logical if the goal is to ensure the permanent flow of visitors and income [21].

To quantify the flexibility of venue function transformation, a Space Adaptability Score (SAS) model can be used. The formula is as follows:

$$\text{SAS} = \sum_{i=1}^k w_i \cdot f_i(x) \quad (2)$$

where, SAS is the total score of spatial adaptability; k is the evaluation dimension (such as structural variability, equipment compatibility, and streamline rationality); w_i is the weight of the i-th dimension (determined by Analytic Hierarchy Process (AHP)); $f_i(x)$ is the scoring function for the i-th dimension (such as a 0-10 point scale).

Some of the transformation functions that were witnessed in Barcelona during the just-ended Olympics in 1992 can be seen as successful. The city adapted the accommodation infrastructure to the Olympic complex: several buildings have thus been transformed into urban constructions and cultural and sports facilities. Thus, through this integration, they have participated in the above regeneration processes of the urban spaces, and the people's inflow has been unceasing, and this has enhanced the economy powerfully.

Other measures, such as sensible arrangements and reducing and including the people in the planning process, are crucial to ensure that the above venues will meet future demands and expectations. For instance, aspects such as open floor plans mean that spaces can be easily changed while producing numerous types of places without radical steps being required.

Thus, among all the multi-functional venue transformations, some of them include the London Aquatics Centre 2012 Olympics and Beijing National Stadium. The practical sessions of swim-bathing are provisioned to community and country competitions and other activities in the London Aquatics Centre, and the uses of Beijing National Stadium, also known as 'Birds Nest' are sports and entertainment. The above reveals the directive need for more progressive planning, resource provision, and commitment in preparing and planning how Olympic infrastructures will be sustained and made relevant.

4.3 Digital and Intelligent Innovation Model

Digital technologies play a crucial role in the innovative reuse of Olympic venues. The application of smart technologies such as virtual reality (VR), augmented reality (AR), and the Internet of Things (IoT) can enhance visitor experiences, improve operational efficiency, and enable better resource management. Digital control systems were employed in the Beijing 2022 Winter Olympics to ensure that the energy used to manage the crowd, and security, among other aspects, was efficient, making it an intelligent venue. These technologies can give accurate information on the venues' number of uses, which will help in the proper utilisation of resources [22].

To analyze the impact of digital technologies such as VR/AR on tourist experience, a Visitor

Satisfaction Index (VSI) model can be introduced. The formula is as follows:

$$VSI = \alpha \cdot SE + \beta \cdot IE + \gamma \cdot PE \quad (3)$$

where, VSI stands for Tourist Satisfaction Index (0-100 points); SE scores service experience (such as tour guide services, facility convenience); IE scores interactive experiences (such as immersion in VR/AR technology); PE is the environmental experience rating (such as venue comfort and cleanliness); α , β , γ is the weight (determined through regression analysis).

Smart environments enable integrated management of space usage and customer requirements by broadcasting current occupancy, users' characteristics, and facility efficiency. Such measurements can contribute to managerial decision-making by shedding light on the best way to use space, the most appropriate time to hold an event, and even ways to improve visitors' experiences.

For instance, smart sensors can detect the number of people in various sectors of the venue, helping to regulate the flow of clients to avoid overcrowded areas. Smart lighting and HVAC systems can also adapt in real time to enhance energy consumption and cut operational expenses [23].

Improving the experience of the visitors is another component of the digital and intelligent innovation model. By utilising VR and AR, new ways of experiencing the history and meaning of the Olympic venues can be proposed to the visitors. Also, the use of digital tools such as mobile applications and interactive kiosks can help visitors receive information in real-time, recommendations, and interactive tours while they visit the destinations.

For example, Olympic fans visiting Beijing National Stadium will be able to watch historical Olympic Games footage using AR applications, which will be more associated with the place. Current technologies, such as contemporary interactive kiosks, offer ways of tour guiding that depend on visitors' preferences.

5 Empirical Research: Case Studies

5.1 International Case Study: London 2012 Olympics

London 2012 Olympics is one of the best examples of the successful application of post-Games arena utilisation. The change of use of Queen Elizabeth Olympic Park was supported by a vast legacy plan constructed even before the start of the Games. This plan specified sustainability, the legacy of the Games for the local community, and future economic returns, which created examples for subsequent Olympics.

After the Games event, the Queen Elizabeth Olympic Park was planned and divided in such a way that anyone could benefit from it. The park covers a large cross-section of the community, including residential use, parklands, sports and recreation, culture and art, and commerce [24]. The transformation aspired to fold the Olympic facilities into the fine texture of the urban milieu of East London, wherein the enhancement of the urban area was another underlying objective and source of legacy as well as benefits that the local populace would derive.

Regarding post-game use, the London Aquatic Centre, designed by Zaha Hadid, remains a good example of venue utilisation. After the Olympics, this complex came to serve the needs of the local people once again but, at the same time, could host foreign competitions. This change meant cutting the possible number of spectators to a mere 2,500, making the arena suitable for community use and cutting expenses. Thus, the centre now offers public swimming, elite sports practice, and other activities and proves its appropriateness and necessity.

You will recall that London had various planned legacies for the 2012 Olympics, including

the Olympic Stadium. After the games, they added purpose to the building and converted it into a multipurpose arena. The most significant transformation is that it was converted for use as the team's home ground of West Ham United Football Club [25]. It also can be used for concerts, athletics meetings, and other social functions. The change process meant there was a structural alteration to accommodate the football but in a way that would make the facilities viable to host other types of functions to keep being used and thus economically viable.

Incorporating these venues into the area, hence the social significance in culture, is a key factor influencing urban regeneration in East London. New investment has been made in the Olympic Park area through regeneration, new opportunities have been generated, local employment has been generated, and detailed facility improvements have been carried out [26]. Another key prerequisite was the engagement of communities to ensure that the reconstructed facilities appropriately addressed the customers' expectations. It turned into a residential area, and thousands of people now live in the Olympic Village, which participates in the housing stock, thus aiding sustainable urban development.

5.2 Domestic Case Study: Beijing 2008 and 2022 Olympics

The Beijing Olympics were held in 2008 and will be hosted in 2022.

Venue reuse and legacy planning are well illustrated by the Beijing 2008 Olympics and, more so, the Beijing 2022 Winter Olympics. Proposed by the Beijing Organising Committee, the concept of sustainability and using the facilities after the Games were considered right from the beginning (Beijing Organising Committee for the 2022 Olympic and Paralympic Winter Games, 2022).

This spectacular, which was invented by the British architect Norman Foster for the 2008 Olympics, turned into a universal structure. A large number of sporting events, cultural activities, health and other related community functions, public entertainment and recreations are held on its premises. The stadium has developed into a tourist centre, with millions of people visiting the area every year. It has also been used in important national events. The monumental event that people can relate really relates to is, the 70th anniversary of the People's Republic of China. The management strategy was more focused on the flexibility and this proved helpful in enabling the structure to be used for more than just the intended use.

Like the Bird's Nest, the Water Cube was another spectacular construction that found its second life after the 2008 Olympics. It was turned into a water park, and most people who visit this place are families and tourists [27]. It was also able to maintain the exterior and interior design of the location but make it profitable at the same time because of the high number of people visiting the place. The features like water slides and pools were additional recreational ones and were developed to attract a large number of people, affecting the popularity and activity of the venue.

For details, the Wukesong Sports Centre, which was originally constructed to host other games during the 2008 Olympics, was converted for ice hockey games in the 2022 Winter Olympics. After the Games, there is a multitude of sporting and exciting events [28]. Thus, the experience of this venue can also be considered successful and prove the application of the concept of multi-functional use of venues when it comes to long-term impact. The centre was designed with multipurpose features and is situated in a central location; hence, it has continued to function dynamically as the key component of Beijing sports and culture (Beijing Organising Committee for the 2022 Olympic and Paralympic Winter Games, 2022).

The legacy issue is likely to be met with positive results by most people as Beijing's Olympic venues have been put to productive use in terms of development contribution. The venues continue to be critical elements of Beijing's tourism and culture facilities for people within the country and from other parts of the world. The smooth incorporation of such venues

into the framework of the overall city development has contributed to the ITA and enriched Beijing's image as a tourist city in the world.

5.3 Countermeasures and Suggestions

(1) Practical Recommendations Based on the Case Studies

Comprehensive Legacy Planning. Thus, the legacy planning of both London and Beijing derived from the case studies is rather extensive. Hence, legacy planning should commence at the inception of venue development and construction processes regarding the ease of adapting the venue for use after the games. The application of flexibility and adaptability in the first place can exponentially increase the sustainability of the Olympic infrastructures.

Public-Private Partnerships. New investment and expertise may be required to maintain and reuse Olympic facilities, which can be procured through PPPs. PPPs can bring together the strengths of both sectors: supervision of the public sector and the prodigiously productive private sector [29]. However, sound legal writings and gainful management solutions are important in managing public interests and private corporate objectives. The implementation of PPPs can result in effective management practices and additional financial resources that are vital after the Games for facilities' further usage.

Community Involvement. The involvement of the local communities entails that they are adequately considerate of what the venues should comprise. This can be crucial because the involvement of the community is one way of ensuring that the relevance of the venues in use rises and, therefore, increases usage as well. It can also lead to the identification of residents embracing and using these sustainably by making them part of the decision-making process.

Technological Integration. Incorporation of digital and intelligent systems can improve the effectiveness of Olympic facilities' usage and perceived quality by visitors. The real-time data of IoT, the advanced entertainment of VR and the additional information of AR are direct applications of this concept since they can be used to manage the location better and entertain the visitors. For instance, IoT sensors can track crowd density and manage visitors' movement, and smart lighting and smart HVAC systems can control energy consumption. These technologies can greatly increase the efficiency and appeal of riveted Olympic venues, as Hu et al. conclude.

Sustainable Business Models. The idea is to come up with diverse income sources that will help support the business of such repurposed venues, including hosting all forms of events, recreational services, and even commercials. The conversion of the Water Cube into a water park is a good example of a sustainable business plan that tends to benefit from the facility's setting and garnishes visitors across the demographic groups and in large numbers, therefore making a lot of money. Regarding the concept of a sustainable business model, emphasis should be placed on obtaining the maximum use of the venues and generating benefits for the locals as well as tourists.

6 Discussion on Sustainable Development of Cultural Tourism after the Winter Olympic Heritage Based on Venue Reuse

6.1 The Role of Venue Reuse in Promoting the Sustainable Development of Cultural Tourism

Venue reuse is, therefore, useful in developing sustainable cultural tourism since it unlocks value from the investment made in Olympic structures, hence improving the profitability of the

investment. This way, such facilities do not turn into idle creations with no use but become functional and beneficial assets for the country's inhabitants and guests.

Economic Benefits. The transformation of the Olympic cities into dual-use facilities has an economic value by offering work, tourism and increased spending. Similarly, within the business function, the London Aquatics Centre and the Olympic Stadium can perform diverse activities apart from sports and games, such as music shows and other community activities thus becoming relevant to the local economy and sustainability [30].

Cultural Enrichment. Cultural accommodations usually become cultural centres hosting various events related to the region's history and modern cultural life. Beijing Bird's Nest is quite often used for cultural performances and exhibitions, so it plays a crucial role in the city's life, both for the locals and for the tourists. This constant use retains a history of the cultural use of such premises and compliments the culture of most cities.

Environmental Sustainability. In particular, the reuse of existing reception venues cuts down on the amount of new construction and thus supports an environmentally friendly agenda. For instance, the development of the Water Cube, which has transformed into a water park, retained the building's large-scale appearance but led to the creation of a recreational facility beneficial for the environment. They move to reduce the imprint of their carbon basically and promote sustainable City growth.

6.2 The Synergistic Effect Between Cultural Activities and Tourism Resources Development

This aspect makes the combination of cultural activities with tourism resources mutually beneficial in the sense that it boosts a destination's general appeal. Cultural tourism entails cultural activities in which the tourists visit other places of interest within the region, thus injecting more capital into the economy.

Cultural Festivals and Events. Special cultural events and carnivals held on the newly adapted Olympic structures also attract many tourists and positively impact the economy. For instance, annual festivals that go with the Queen Elizabeth Olympic Park culture make individuals visit, thereby making them see other parts of London. Such events thus bring about the liveliness of the environment, which increases the cultural attraction of the destination and, hence, tourist revisits.

Tourism Infrastructure Development. Modern and effectively managed and/or versatile facilities enhance the creation of tourism-related facilities, including hotels, restaurants, and shops. Beijing's Olympic venues' success in utilisation has boosted tourism facility development around the Olympic site, whereby tourists get value-added experiences in their travels and conserve more sustainable practices.

Community Engagement. Incorporating cultural activities at abandoned buildings ensures the community feels like it owns the initiatives, hence the sustainability of the events. Local cultural and artistic events, including painting displays and sports festivals, enhance the social capital and create value that attracts tourists, which would gradually help to improve the quality of people's lives through tourism development.

6.3 The Dual Role of Policy Support and Market Mechanism

The development of cultural tourism involving the reuse of venues poses a policy conflict that has to be resolved by the interactive implementation of both policy approaches and market forces. Government policies identify the necessary requirements and promote pertinent incentives, whereas market forces promote the efficient provision of goods and services according to the customer's demand.

To analyze the synergistic effect of policy support and market mechanisms on the sustainable operation of venues, a Dual Factor Driven Model (DFDM) can be constructed. The formula is as follows:

$$DFD = \lambda \cdot PS + (1 - \lambda) \cdot MM \quad (4)$$

where, DFD is a two factor driving index (0-1); PS represents the intensity of policy support (such as fiscal subsidies and tax incentives); MIMI refers to the maturity of market mechanisms (such as private enterprise participation and competition intensity); λ is the policy weight (determined by expert scoring).

Policy Support. Government policies enable the reuse of Olympic venues through PPPs, tax credits, and the promotion of cultural activities. For instance, this report found that supportive policies helped London's Olympic legacy succeed when its Olympic Park was regenerated into a functional part of urban life. Guidelines for encouraging sustainable practices, including green building codes and sustainable tourism certification, also aid in the sustainability of these projects.

Market Mechanisms. A competitive market environment guarantees that transformed facilities run effectively and meet guests' needs. Many operational strategies derived from markets, including variable pricing, customer appeal, and diversified income sources add to the financial viability of such places. Thus, the reuse of the Water Cube into a profitable water park reflects how the market organises and promotes innovation in projects of venue reuse. By using the insights gathered from the marketplace to design solutions to suit the visitors, there will always be a marked increase in the number of visitors and hence the revenue.

Combined Impact. The synergies of policy support and market mechanisms make for a stable environment in the development of cultural tourism. This means that while policies offer the framework and stimuli for such changes and instruments, markets offer profit, loss, and other incentives for operational efficiency and innovation. This way, it guarantees that post-Olympics facilities remain active social and leisure sites for the people of the given city and tourists. Thus, it is possible to note that using an integrated strategy with the organisation of cultural tourism in London and Beijing indicates its efficiency in achieving sustainable development.

7 Conclusion and Enlightenment

7.1 Conclusion

This paper has examined the dynamic effects of Winter Olympic heritage on cultural tourism with emphasis made on the venue redevelopment approach to the successful execution of sustainable development. The government's reuse of Olympic sporting venues can therefore be seen to have a great economic value in the creation of employment opportunities, the creation of business tourism and local consumption patterns. They also act as cultural centres because they host different functions that act as a cultural boost to society and offer successive value.

Adapting current Olympian structures into multipurpose halls is environmentally sensitive because there is no need for new construction, affording surrounding ecosystems a break. Thus, the preservation of these historic buildings and monuments that remain as symbols of cities fulfils the principles of sustainability in the development of cities without offending citizens' aesthetics.

When cultural activities are combined with other tourism resources, they complement each other and increase the beauty of tourist places. Functioning festivals, occasions, and gatherings

at reconstructed places revitalise the economy and improve touristic opportunities while promoting sustainable tourism. Thus, optimising policy measures and market conditions is significant for correctly utilising the Olympic structures. There is a need for government policies and legislation such as those that promote or allow PPP structures, incentives, and sustainable initiatives. At the same time, strategic marketing initiatives maintain supply chain management and organisational adaptability to visitors' needs.

There are several examples of such practices. For instance, facilities in London and Beijing can be referred to as reuse for other purposes. It would be quite helpful to notice that these examples serve to explain the 'how' of theoretical frameworks when experience proves the real-life replication of the strategy's benefits and limitations.

7.2 Inspiration of Sustainable Development of Cultural Tourism after the Legacy of the Winter Olympics

The paper gives several major conclusions and directions for the research on sustainable cultural tourism development. It is, therefore, understood that the management of the post-game utilisation concept has to be well coordinated across the economic, cultural and environmental elements. Top managerial intentions reveal that concerning the maximised sustainability concept, it is necessary to apply and solve all three dimensions of sustainability. Consequently, when the locals are engaged in planning and executing venues for the reallocation of the programs, their sustainability is ascertained. Such activities help the communities take pride and ownership, making these projects culturally and sustainable. The deployment of digital and intelligent systems should, therefore, be understood as taking stances that can enhance the desirability of the revitalised places.

Applications of such technologies can improve the efficiency of operations, their customers, and their impacts on the environment.

Hence, it is possible to underscore that it is important to understand the concept of PPPs regarding structures reclaimed for the Olympics' reuse. They incorporate integration of the strengths of the two entities, the government monitoring of the public sector and efficiency, and the innovation of the private sector. So, as established in this paper, venue reuse and sustainable cultural tourism must have favourable policies. Some policies that can encourage the high feasibility of the projects include grant support, deregulation, and incentives that support the projects. Thus, changing the cultural tourism direction into a long-term perspective becomes feasible only in the framework of innovation and the shifts in the approach to developing the tourism industry. The authorities of the Olympics should look into this reality and, therefore, evaluate life after the Olympics to determine how the facilities could earn benefits and relevance after the Olympics.

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