Abstract

Hosting mega-sport events can benefit various areas, including the economy, society, culture, and environment. In detail, a sport event not only promotes the sale of sporting goods and the operation of sports facilities, but also affects various corporate activities such as promotion, advertisement, and product promotion of sports as an opportunity and means for sports to develop into an industry itself. In addition, the promotion effect of not only the host city, but also the companies and tourism resources that are located there can promote the competitiveness of local industries and vitalize the local economy and exert various influence on the community and residents, including enhancing the image of the host city and raising the brand value.

It is true that mega events such as the Olympics are national events that bring together the capabilities of the host region, drawing attention from the public through direct and indirect positive economic effects such as enhancing the brand image of the hosting countries, creating jobs, and boosting tourism. Unlike the Summer Olympics and the World Cup, however, winter sports events involve huge investments in building infrastructure for stadiums, athletes’ villages, and other facilities because the number of participating countries and athletes is small and the games are held in areas away from the city. In addition, the use of facilities is relatively difficult compared to summer sports events as they are often held in sparsely populated mountainous areas. Therefore, due to the failure of post-utilization of one-time installations, in which the competition is held in a flashy manner amid the concentration of global attention, its role and function are extinguished after the event, so the government is facing serious reality such as huge facility maintenance and interest repayment on investment costs.

Therefore, this study considered the post-use of mega-sport event facilities and reviewed the plan for post-use of the winter sports stadium, and based on this, presented strategic measures to maximize the post-utilization of sports facilities to increase the legacy of mega-sport events, especially winter sports events. The following conclusions were obtained:

First, it is necessary to maximize variable elements in the stadium construction phase to enable the use of various facilities (multi-purpose complexes, multi-functional facilities, mobile facilities, etc.)

Second, to minimize the construction costs of sports facilities and avoid excess or redundancy, the distribution of sports facilities and the selection of sports hub cities should be made (selection and concentration considering sports events and venues).

Third, a construction plan is needed to cover facilities targets not only for professional athletes and local residents, but also for visitors and travelers (overcoming the limitations of winter sports and demographic limitations of host cities, and reviewing the utilization of tourists).

Fourth, various programs related to winter sports need to be developed (increasing efficiency in the utilization of winter sports facilities, linking the cultural industry such as four-season entertainment and concert halls).

Fifth, they need to be commercialized for tourism (attracting foreign visitors and tourists through the development of various tourist products, such as sports experience and stadium tour).

[Keywords] Sport Legacy, Mega-Sport Event, Post-Use, Sport Facility, Winter Sport
1. Introduction

The 2018 PyeongChang Winter Olympics presented a vision of "New Horizons," opening a new horizon for winter sports in a new stage of Asia with great potential together with the young generation worldwide and successfully hosted it with the goal of "leaving a sustainable legacy to the host city and country"[1]. Under these goals, it stated the term "sustainable legacy" and expressed the willingness to leave the Olympic stadium facilities as a long-term legacy. This not only conformed to the IOC's recommendation of "sustained Olympics" but also became an important issue to determine whether the Olympic Games will be successful or not[2].

Until the final bid for the 2018 PyeongChang Winter Olympics was confirmed, a lot of institutions and organizations had published a number of studies on the economic impact of hosting the Winter Olympics on the local economy and the Olympic legacy, but after the final bid was decided, it became difficult to find such studies[3]. Prospects for the economic ripple effects that will be generated after the Olympic bid were largely positive even during the previous bidding for the Winter Olympics. When new stadiums and facilities were built for the games, there were positive expectations on the economic ripple effects such as improving the brand image of the hosting country and creating jobs. However, the financial burden of local and central governments, which had spent a considerable amount of money on the construction of stadiums, has often hampered the development of local governments for a long time since the Winter Olympics and failed to substantially utilize the facilities, thus failing to produce the expected positive effects. Although the Olympic Games are certainly effective for temporary and short-term stimulus and infrastructure expansion after the hosting the event is decided, other economic effects are not only very limited or even non-existent, but also result in financial burdens beyond the funding available[3][4]. In fact, it is not difficult to find a case in which a stadium facility invested with a large amount of money has been reduced to a white elephant in the past Winter Olympics. The reality is that the athletes use facilities for the games during the event and then the stadiums after the event are abandoned and financial problems such as huge facility maintenance costs and interest payments on facility investment costs follow.

Successful hosting of the Winter Olympics will involve huge investments to prepare facilities such as the best stadiums and athletes' villages. This is especially because unlike the Summer Olympics and the World Cup, the Winter Olympics are held in an area away from the city center[5].

For this reason, hosting the Winter Olympics is always accompanied by facility investments such as stadiums and athletes' villages, and through such investments, the host country is stirred up by social controversy over the over-investments to make stadium facilities a long-term legacy or a landmark for the region or the country. In other words, there are many cases where negative economic ripple effects in the mid- to long-term occur by making excessive facility investments to host the short-term events[6].

Not only the 2018 PyeongChang Winter Olympics, but also the 1998 Nagano Winter Olympics to the 2014 Sochi Winter Olympics resulted in a significant net loss that went straight to the burden of citizens of the host city[7][8]. As Figure 1 shows, the hosting of the Winter Olympics cost a lot of national and local expenses for stadiums, support facilities, infrastructure, and transportation networks, a lot more than was expected during the actual event[5]. This shows that despite the positive economic ripple effects of the Olympics, the trend of exceeding the budget spent on hosting the Games continues, meaning a more firm and systematic approach to the post-utilization of Winter Olympic facilities is needed, and the importance of sports legacy, including the post-utilization of facilities, is being emphasized to streamline the costs of hosting them.
Figure 1. Cost overrun at the winter olympic games.

Today, hosting international sports events such as the Olympics is perceived as comprehensive international events beyond the mere venue of international competitions among the world’s sports people. However, there is no lack of criticism about the recent Olympic events being excessively commercial and large-scale, and some argue that pure amateurism is diluted and the intended effect is minimal considering the sheer volume of investment. Some also point out that excessive facility investment to host the short-term event may have negative impact on the economy in the mid- to long-term[9].

The overall cost of the Winter Olympics facilities is far higher than that of other mega-sport event facilities due to the "needs for highly specialized facilities." Specialized facilities for the winter sports are highly inflexible in post-utilization despite the high construction and operating costs. These facilities were built with a focus on training and hosting competitions for top international-level athletes, so after the competition usability for the general public will inevitably be low. When the Olympic stadiums are preserved as the Olympic legacy, it is only natural that they are used as its original purpose of the facility or as a multi-purpose convention center[10].

However, amid this limiting reality, there are clearly good possibilities for recycling stadium facilities after mega-sport event through diversified approaches. Facilities such as an ice rink can be used for cultural and artistic purposes, recreational purposes, school and club sports programs, events such as concerts and exhibition performances, not just for training of athletes or just as a sport stadium. In particular, more rigorous follow-up planning is required in the event of hosting a mega-sport event related to winter sports, which is accompanied by huge financial burden[11].

Therefore, this study aims to present policy suggestions that will be useful for planning the post-use of the facilities for winter sports related mega-sport events and to present strategic measures to maximize the promotion of sports legacy by surveying and analyzing the utilization status of facilities in the past Winter Olympic venues.

2. Methodology

The purpose of this study is to present strategic measures to maximize the increase of sports legacy through the search for post-use measures of the stadiums after mega-sport events. First, the concept of mega-sport event legacy will be newly established through literature research and the components of mega-sport event legacy will be established. In particular, the three areas of sports legacy, that is, physical, economic, and social legacy, presented by Gratton, Dobson, & Shibli(2012), Gratton, Shibli, & Coleman(2009), and Kim(2013) will be used to systematize
the components and theoretical structure and work as a framework for deriving the study results[12][13][14].

Second, the use of each component of mega-sport event legacy will be analyzed through the case study method for stadiums that have been well used and under-utilized after the events. Based on the use of stadiums for past mega-sport events centered on the Olympics, the importance and strategy of the post-use measures of the stadiums will be analyzed.

Third, based on the theoretical system of mega-sport event legacy, the economic value and significance and influence of mega-sport event legacy and the relation between mega-sport event legacy and the regional development will be analyzed.

Finally, based on the results of the literature research and case analysis, ways to use the stadiums after mega-sport events will be sought. Through this, strategic measures to maximize the growth of sports legacy will be presented. Through active application of sports legacy from the stage of bidding for hosting future events, it will attract successful mega-sport events and further provide a framework for the tangible legacy left after the event to have a positive long-term and short-term impact on the regional development.

3. Sport Legacy

The literature states that sports legacy has many meanings, which are difficult to define in a universal manner, but can be described as tangible and intangible values that occur in a host country or host city in general through sports events[11]. Yeom(2012) said that the concept of legacy generally means the positive effects that will emerge after the mega-sport event[15], while Roche(2000) and Mangan(2008) argued that they are all tangible and intangible things that would remain in the long run[16][17]. Through the hosting of mega-sport events, such legacy have had a wide impact on the economy, society, culture, and environment[18][19] and tourism[4]. Yoo(2011) divided the concept of legacy into mental(intangible) and physical(tangible) legacy. Mental legacy refers to the spread of sports spirit and ideology and physical legacy refers to new sports facilities and social overhead capital(SOC) facilities to host sports events[20]. Sports legacy can be used in different languages and cultures in different forms. They have planned-non-planned, positive-negative, tangible-intangible structure[11] and their impacts continue to be applied throughout society, including politics, economy, society, culture, environment, and sports in the host city and country[21].

Recently, as competition among countries to host mega-sport events heat up, the International Olympic Committee(IOC) has set the host city's plan for the Olympic legacy as an important evaluation standard. The change which came after a symposium on the legacy of the Olympic Games held by IOC suggested that more studies should be conducted on the planning and program management of the Olympic legacy. After the symposium, IOC included the need for positive heritage to contribute to the quality of life of the host city and country in the IOC Charter[22].

Table 1. Olympic legacies defined by international olympic committee.

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<tr>
<th>Types of legacies</th>
<th>Examples</th>
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<tr>
<td>Sporting</td>
<td>- Continuous use of sporting venues</td>
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<td>- Increasing the participation in sports</td>
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<tr>
<td>Social</td>
<td>- Promoting image and awareness of the host country</td>
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<td></td>
<td>- Education of the olympic spirit and values</td>
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<td></td>
<td>- Enhancing social integration</td>
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<tr>
<td>Environment</td>
<td>- Revitalization of the cities</td>
</tr>
<tr>
<td></td>
<td>- Use of environment-friendly energy</td>
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</tbody>
</table>
Urban
- Renewal and beautification of urban area
- Improving transportation infrastructure

Economic
- Expanding business opportunities
- Creating jobs
- Boosting tourism industry


3.1. Physical legacy

A typical physical legacy is infrastructure. Infrastructure obviously means the sport facilities for the training and competition, but also the general infrastructure of a city such as hotels, airports, roads, telecommunication, housing for athletes, media, and officials, parks, etc.[14][23]. All infrastructure left after an event should be suitable for the development plan of the city, but it has almost always been a big problem called the white elephant[13]. The city of Athens spent $15 billion on permanent stadiums for the 2004 Olympic Games and now many are abandoned and in various states of disrepair. The stadiums for the 2008 Beijing Olympics are not as rotten as the ones in Athens, but they are losing money because of their inability to secure long-term tenants[24].

Temporary or flexible constructions can avoid negative legacies such as oversized and extraneous facilities[19]. The 80,000-seat main stadium for the London Olympics has been reduced to 25,000 after the Olympics and is being used as a home stadium for one of the Premier League football team, West Ham United[24].

3.2. Economic legacy

The economic legacy from hosting mega-sport events can arise not only from direct legacy but also from indirect aspects, such as increased economic activity, increased production and consumption, job creation, and the rise of GDP through it. Not only will the host cities with a low profile outside and in the country have a large demand for tourism since the sports event, but they will also greatly enhance the awareness of regional and national brands, which will be accompanied by enhanced image and higher prices of export goods. This huge economic ripple effect is the reason why not only local governments but also the national level are competing fiercely to host mega-sport events[4][15].

Each item that constitutes the legacy from a mega-sport event is correlated with each other, not independently influenced by a specific sports event(Kang, 2006; Preuss, 2006). In particular, physical legacies such as sports facilities for training and competition, transportation facilities such as roads, railways, aviation and transport, and tourism facilities such as hotels and restaurants produce continuous economic ripple effects in the various industrial sectors for the local and national economy. From a sport perspective, this physical legacy can maximize the economic value as a new and potential industry by having a profound impact on the development of the sport industry[23].

3.3. Social legacy

The social legacy benefits after hosting the mega-sports event include the pride and spirit of hosting the mega-sport event, the benefits of participating in world culture and events, and social integration. It can also benefit the community and the public through environmental improvement, conservation of natural space, environment-friendly facilities, and the use of renewable energy sources[26][27].

Some of the most important social legacies generated from hosting mega-sport events are the regenerated and enhanced emotions for the public[11]. The mega-sport event gives the nation’s leaders a common vision for gaining international prestige, and citizens may be emotionally involved. The pride of hosting such an event also creates confidence that is “I-can-do-
it’, as well as local awareness, image, vision and motivation[11][26][27]. One example is the 1988 Seoul Olympics’ creation of a national perspective that includes feelings of vitality, participation and recognition as well as international perception that it is modern and technically up-to-date[28]. The Chinese were keen to demonstrate their increasing economic importance through the Olympics in 2008[29].

4. Winter Mega-Sport Events over Time

The 17th Lillehammer Winter Olympic Games has attracted many tourists as a world-class winter sports resort since its preparation stage[30] by planning various events to build stadiums and enhance post-use by minimizing artificial decorations on the site with the plan of constructing the Olympic legacy and sustainable green facilities. The Lillehammer Olympic Bobsleigh & Luge Track, which is used as a national facility for Scandinavian Park, is used as a bobsleigh, luge stadium, a venue for domestic and foreign sports events, a training camp for international competition and for the military, and a bobsleigh experience center for the general public. Especially in the summer of 1993, it became widely popular among tourists by being designed as "Wheel Bob(the summer’s equivalent of Bobsledding)”[31].

The Gjøvik Olympic Cavern Hall, where the ice hockey games took place, is the largest artificial cave stadium in the world and is visited by many tourists and is used as a shelter against nuclear, biological, or chemical attacks in case of emergency. In addition, meticulous efforts to protect the environment were added. The organizing committee used potato starch to make the plates to be used during the event and used them as pig feed when the event was over. They had a thorough plan to protect the environment, including the recovery of all the bullets used in biathlon, and received the rave reviews of "White-Green Games" from the IOC president at that time[32].

What’s most noteworthy about the Lillehammer Winter Games in particular is that the central and local governments and the Olympic Committee established cooperative governance relationships to maximize the Olympic legacy. The central government and parliament took the lead in successfully inducing local governments, and the municipal authorities and citizens of the cities involving the Olympics, including Lillehammer, actively cooperated. In response to the Norwegian parliament’s decision, there was a clear allocation of roles among the central and local governments and the organizing committee before the Lillehammer Olympic Games were promoted in earnest, and such granular organizational power among each of the propellant groups created greater synergy[33].

On the other hand, the 1998 Nagano Winter Olympics and the 2014 Sochi Winter Olympics have become representative venue suffering from the "Curse of the Olympics" due to astronomical facility investments and the lack of a post-use program for those facilities. In the Nagano Olympics, too much money was spent on the construction of stadiums by insisting on state-of-the-art facilities, over-investing in social overhead infrastructure such as roads and airports, and lack of a post-use plan[32]. The Sochi Olympics, in particular, has been a headache for the Russian government due to the government spending of more than $50 billion, the highest amount ever. Sochi has created 14 new facilities that are underused after the event, and without proper post-use plans, it is costing the Russian government a huge financial loss[34].

The 22nd Vancouver Winter Olympics is Canada’s third Olympic Games, along with Montreal Summer Olympics in 1976 and Calgary Winter Olympics in 1988. The Vancouver Olympics were held in distributed areas with not only Vancouver, but also nearby Richmond, Whistler, and donated land in University of British Columbia(UBC).
The Vancouver Olympic Committee (VANOC) has established and implemented construction plans for stadiums and related facilities, with a focus on maximizing their potential and sustainability in the post-use of stadiums and related facilities. In close cooperation with the Olympic partners such as local governments of Whistler and Richmond and UBC, the venues used in the Olympics were divided into recreational, elite sports, and community center purposes. To enhance the sustainability of the stadiums and related facilities, the 'Green-Building Concept' was adopted, being designed, constructed, maintained, and managed in a natural way (including the use of environmentally friendly construction materials, energy, and water resources). Extra efforts were put in the design of the facilities including using rain and heavy water and recycling hot air in buildings, etc. to lower the operating costs of post-management institutions. In addition, from the design phase through public hearings with post-management agencies and local residents, they made efforts to reflect the opinions of post-users as much as possible[35].

"The Hillcrest Curling & Nat Bailey Stadium Park," where curling events were held during the Olympics, has been renamed "the Hillcrest Vancouver Olympic Center" and is operating as a multi-purpose local recreation center. It consists of an ice hockey rink, a gym, a library, and six curling fields and is operating an additional aquatic sports facility, including two additional swimming pools. $14 million were injected to convert to post-multipurpose facilities and $34 million more were spent to add an aquatic center. Vancouver Board of Parks & Recreation is the operating body of the Olympic Center[36].

The University of British Columbia (UBC) winter sports center, where ice hockey games were held, is now being actively used as a multi-purpose recreational and sports facility for popular sports revitalization, renamed as the "Doug Mitchell Thunderbird Sports Centre." With UBC as its operating body, the center is used as a 5,000-seat event hall that can host various winter sports programs, such as ice hockey and skating, and a variety of other events, such as concerts and musicals, mainly for youth and young adults[37].

The Richmond Olympic Oval, where the speed skating event took place, was removed after the Olympics, renovated as a mixed sports facility, and is now recognized as the world's best public recreation center[33]. It was constructed from the design phase considering a change from a stadium to a post-Olympic multi-purpose sports center. It serves as the center of the newly constructed waterfront development area. It includes a fitness center, two international standard ice links, 18 badminton courts, 13 volleyball courts, 10 basketball courts, three FIFA standard indoor football fields, a 200-meter track, a 100-meter track with five lanes, and an indoor boat race training course and offers a variety of recreational programs for individuals and organizations. The operator is Richmond Olympic Oval Cooperation under the city of Richmond and has signed a $1 for 21 years lease contract with Richmond City. After the Winter Olympics, it hosted various domestic sports events for about nine months and also operates training programs to foster promising athletes in various sports. The total number of visitors was tallied at about 400,000 in 2010, with an average of 15,000 members per month using the facilities and operating three adult sports leagues to attract 96,000 visitors. 82 percent of the members currently registered as regular members are citizens of Richmond, and 18 percent are residents of nearby cities[38].

The city of Whistler has established 'Whistler Sports Legacy' as the operator for the post-Olympic stadium and is in charge of managing Whistler Olympic Park, Sliding Centre and Athletes’ Center. The purpose of ‘Whistler Sports Legacy’ is to attract international competitions and provide a variety of winter sports opportunities for visitors[39].

5. Post-use of Sport Facility Strategies

5.1. Reuse of sport facility
The reuse of sport facilities can be much more difficult for the winter sports events than the summers. More facilities can be built with temporary structures (e.g., main stadium reduction, demolitionable temporary stadium, beach volleyball courts in London Olympics) that can be demolished or reduced after the event for the summers, therefore eliminating the need for reuse. However, many of the sports facilities needed for the winter sport events are not so flexible. For example, ski jumps made according to Olympic standards can only be used by some elite athletes. Similarly, possible post-event use for sliding tracks is limited. Winter sports such as luge and bobsleigh generally do not have many fans[40][41]. As a result, the reuse of winter sports facilities often focuses on the training of elite athletes and the hosting of international competitions, so it is not beneficial to the general public[10].

Therefore, it is imperative to establish sufficient post-use strategies through conferences or public hearings involving the national and local governments, private companies, and residents when considering to build sport facilities, especially winter sport facilities. It should be accompanied by efforts to identify the demand for various winter sports that can be held in the future and develop new sports related to winter sports so existing facilities can be continuously recycled at various sport events in the future.

5.2. Winter sports hub city

The number of sites where winter sports can be held is much less than those where summer sports can be held[40]. This is because a high mountain environment is required for skiing competitions and must have reliable snow[42]. In addition, only rich countries can afford to host winter sport events because of the high cost of installing infrastructure[40]. This restriction has so far allowed most of the Winter Olympic Games to be held in the European Alps (e.g., Grenoble, Albertville, Torino), North America (e.g., Calgary, Salt Lake City, Vancouver), and Japan (Sapporo and Nagano)[10].

As the participation in sport activities increases, local governments need to take the lead in constructing sport facilities to meet the demand for sport activities, but systematic investigation for the operation and management of sport facilities and finding improvement measures should precede the expansion of supply. Through this process, national and local governments need to come up with measures to resolve excesses and overlapping investments that could be caused by excessive competition to attract sports facilities that require a huge amount of money financed[25][43].

There are financial limitations to building all sports facilities in all local governments, and they also lack of professional management skills and spend a lot of money on personnel and maintenance costs per unit of facilities compared to integrated management of various facilities. To solve these structural problems, it is desirable to divide the nation into several areas and manage them in a unified manner by region by region. In particular, winter sport facilities which cost more to build and operate than summer sport facilities, can prevent unnecessary overlapping investments by creating strategic winter sports hub cities in small and medium cities, including some large cities, as well as building winter sports facilities there.

5.3. Multi-functional facility

The facilities built for mega-sport events shall be multi-functional spaces. That is, they should be places where sport activities can be done not only for some elite players but also for all public. These facilities can also be used as beneficial places to spend leisure time, thereby expanding opportunities for rest and entertainment for reproduction. Therefore, sport facilities should be able to relieve stress in a healthy and productive manner and perform various functions such as being used as a venue for various events[44].
Whether it is an upgraded existing facility or a new one for the mega-sport events, sport facilities could be multifunctional, such as a gym. Ice facilities do not need to be adapted for use after the event and require minimal adaptation. They are multifunctional because they can host cultural activities related to various ice skates, and can contribute to expanding sports opportunities not only for top players but also for the general public[17].

Attracting tourist is another way to use multi-purpose facilities built for the mega-sport events. The idea was probably first initiated in the scenic Holmenkolen Ski Jumping in Oslo, Norway. Other host cities are turning Olympic facilities into recreational sports parks such as Olympic Park in Lillehammer to provide various functions[45]. In addition, tourists from winter-free countries like Southeast Asia want to travel to sports facilities such as ski resorts built for mega-sport events, experience sports events, tour the facilities and more[46]. Therefore, when building sports facilities, it is necessary to consider creating amenities(lodging, restaurants, etc.) for tourists to be used for multiple purposes after the event.

Location selection is also very important to increase the sustainability of the facility. It is to construct in an area with a large floating population and easy access, or to select an area with future development plans, considering that many people will use it as a venue for participation in sports activities for leisure selection even after the event ends[19].

Finally, it should be constructed as a facility that is easily accessible to all, including infants, teenagers, women, the elderly, and the disabled, and available throughout the year. It should also be designed to take into account the eco-friendly environment as much as possible and relate to sports activities[14].

6. Conclusions and Suggestions

This study considered the cases of post-use of mega-sport event facilities and reviewed the plan for post-use of winter sports stadiums, and based on that, aimed to present strategic measures to maximize the post-utilization of sports facilities to increase the legacy of mega-sport events, especially winter sports events.

Thus, the following conclusions were obtained:

First, it is necessary to maximize variable elements in the stadium construction phase to enable the use of various facilities(multi-purpose complexes, multi-functional facilities, mobile facilities, etc.)

Second, to minimize the construction costs of sports facilities and avoid excess or redundancy, the distribution of sports facilities and the selection of sports hub cities should be made(selection and concentration considering sports events and venues)

Third, a construction plan to cover facilities targeting not only professional athletes and local residents, but also visitors and travelers is needed(overcoming the limitations of winter sports and demographic limitations of host cities, and reviewing the utilization of tourists).

Fourth, various programs related to winter sports need to be developed(increasing efficiency in the utilization of winter sports facilities, linking the cultural industry such as four-season entertainment and concert halls).

Fifth, they need to be commercialized for tourism(attracting foreign visitors and tourists through the development of various tourist products, such as sports experience and stadium tour).
Sports legacy is not a relic that is automatically left behind when a sporting event is held, but a deliberate product of the ongoing process of planning, practicing, and coordinating from a long-term perspective[9]. Accordingly, cities that wish to host mega-sport events should provide detailed explanations on how to create a sports legacy in the bidding file and ensure the implementation[20]. The value of successful sports legacy may be appreciated when it is supported by the strategic planning capability to present a sustainable role model through the establishment, implementation, evaluation, and preservation of appropriate organization and objectives[47].

Academic discussions on the use of the stadiums have been mainly focused on sports events such as the Summer Olympics, the FIFA World Cup, and the Asian Games, and access to winter sports events centered on the Winter Olympics is relatively sluggish(Alberts, 2011). While building safe and complete infrastructures and stadium facilities is also important to successfully host the upcoming winter mega-sport events, it is more urgent to come up with reasonable and comprehensive measures to maximize the post-utilization of these facilities as part of the success and development of sport legacy.

7. References

7.1. Journal articles


7.2. Thesis degree

7.3. Books

7.4. Conference proceedings

7.5. Additional references

8. Contribution

8.1. Authors contribution

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<th>Initial name</th>
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<td>SHB</td>
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