Universidade do Minho
Escola de Engenharia

Farideh Baroghi Bonab

The role of mega-events in sustainable urban transformation and urban quality promotion

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e Professor Doutor Paulo Jorge Gomes Ribeiro

dezembro de 2018

STATEMENT OF INTEGRITY

I hereby declare having conducted my thesis with integrity. I confirm that I have not used plagiarism or any form of falsification of results in the process of the thesis elaboration. I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

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Signature: 

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Abstract

This thesis developed a sustainable urban sport mega-event model for host cities providing a complete process from urban planning, management to the event organization. The proposed model is assembled through the reviewing of sport mega-events' impacts on host cities. The literature review previously undertaken explored sport mega-events' impacts and their relation with urban sustainability based on physical, environmental, economic and socio-cultural dimensions. The research examines the alignment of event planning and implementation actions within a set of urban sustainable development objectives selected from a group of 63 indicators on a range of outcomes and impacts of the most recent sport mega-events. This thesis evaluated the role of mega-events in sustainable urban transformation and urban quality promotion in Rio de Janeiro, with the main objective of exploring if 2016 Olympics succeeded in transforming the city in a sustainable way through hosting sport mega-events. The impacts were then assessed through a survey given to Brazilian experts about the Olympics in the city of Rio de Janeiro. The survey indicates the same results as the literature review about the sport mega event impacts in developing countries. The experts' opinions pointed out that the huge expenditures on large-scale projects and sport infrastructures that are so different from daily requirements do not meet the needs of the majority of Rio's inhabitants. The statistical quantitative analysis of impacts intensity highlighted that this sport mega-event had much larger negative than positive impacts, in all four dimensions, especially in the environmental dimension. In order to gain a deeper understanding of the role of hosting the mega-events in urban transformations and quality promotion, an in-depth investigation especially in physical and environmental dimensions was undertaken for the case study of Rio de Janeiro. All these research techniques, literature review, modeling, assemblage of indicators, survey of experts and case study analysis of four Olympic zones, were relevant in detecting the challenges that a host city may face. Overall, the three fold evaluation including the survey on expert's views, sustainability assessment through impact indicators and also the evidence from the Olympic zones (Barra, Deodoro, Maracanã and Copacabana) validates the standpoint that there is little improvement in terms of sustainable urban transformation. This thesis also discussed the relationship between impact indicators and urban sustainability. A slight alignment was found in terms of event-related transport expansion in the city and green spaces improvement, especially in the Deodoro zone. Therefore, management system in cities of the developing countries often does not benefit from event-related transformation. In this way, effective governance of

hosting a sport mega-event is necessary to drive sustainable development. The application of the proposed model helps to improve event planning, management and organization processes in order to achieve a more sustainable urban development in the host cities, especially in developing countries.

Resumo

Esta tese desenvolveu um modelo de megaevento desportivo urbano sustentável para as cidades anfitriãs, compreendendo todo o processo desde o planeamento urbano até à organização do evento. O modelo proposto foi construído com base na revisão bibliográfica sobre os impactos dos megaeventos desportivos nas cidades anfitriãs. A revisão da literatura realizada explorou os impactos dos megaeventos desportivos e sua relação com a sustentabilidade urbana, a partir de dimensões físicas, ambientais, económicas e socioculturais. A investigação analisou a implementação das ações de planeamento com a realização dos eventos, integrada em um conjunto de objetivos de desenvolvimento urbano sustentável selecionados a partir de um grupo de 63 indicadores relativos a resultados e impactos dos megaeventos desportivos mais recentes. Esta tese avaliou o papel dos megaeventos na transformação urbana sustentável e na promoção da qualidade urbana no Rio de Janeiro, com o objetivo de analisar se as Olimpíadas de 2016 conseguiram transformar a cidade de forma sustentável por meio da realização desse megaevento desportivo. Os impactos foram então avaliados por meio de um inquérito a especialistas brasileiros sobre as Olimpíadas na cidade do Rio de Janeiro. Os resultados deste inquérito são semelhantes aos obtidos na revisão da literatura sobre os impactos de mega eventos desportivo nos países em desenvolvimento. As opiniões dos especialistas realçam que apesar das despesas elevadas em projetos de grande escala e infraestruturas desportivas, estas não respondem às necessidades diárias da maioria dos habitantes do Rio de Janeiro. A análise estatística quantitativa da intensidade dos impactos destaca que este megaevento desportivo teve muito mais impactos negativos do que positivos, nas quatro dimensões, especialmente na ambiental. A fim de obter uma compreensão aprofundada do papel dos megaeventos nas transformações urbanas e na promoção da qualidade urbana, realizou-se uma investigação detalhada, especialmente nas dimensões física e ambiental, para o estudo de caso do Rio de Janeiro. Todas estas técnicas de análise, revisão da literatura, modelação, seleção de indicadores, auscultação da opinião de especialistas e análise de estudo de caso das quatro zonas olímpicas, foram relevantes na determinação dos desafios que uma cidade-anfitriã pode enfrentar. A avaliação tríplice, incluindo a perspetiva dos especialistas, a avaliação da sustentabilidade por meio de indicadores de impacto e também a análise detalhada das zonas olímpicas (Barra, Deodoro, Maracanã e Copacabana), valida a hipótese da ocorrência de pequenas melhorias de transformação urbana sustentável. Esta tese também analisa a relação entre indicadores de impacto e sustentabilidade urbana. Foi encontrada uma correlação, ainda que fraca, entre o

megaevento e a expansão do sistema de transporte na cidade e o acréscimo de espaços verdes, especialmente na zona de Deodoro. Em suma, os sistemas de planeamento e gestão urbana das cidades anfitriãs dos países em desenvolvimento, não beneficiam muitas vezes da transformação relacionada com o megaevento. Neste contexto, a relevância da governança é determinante para impulsionar o desenvolvimento sustentável. A aplicação do modelo proposto permite melhorar os processos de planeamento, gestão e organização de megaeventos, especialmente nos países em desenvolvimento.

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Chapter 1 : Introduction

1.1. Background

Sport mega-events generally involve large scale investment, complex decision making by various organizers and significant potential impacts (Li & McCabe, 2013; Li & Jago, 2013). The Olympic Games as one of exclusive sport mega-events have emerged as a significant catalyst of urban change and they may provide an opportunity for the sustainable urban development of the host city. These unique circumstances of urban changes, on a large-scale and at excessive speed, allow city authorities to improve urban infrastructures which would otherwise take decades to realize. Events can help to generate new knowledge and transfer it from one city to another. The knowledge can be transferred from international consultancy to local agencies and vice versa, due to the involvement of world-class planning consultants in the event-related infrastructure plans (Azzali, 2017). Hence, they help twofold in enhancement of local planning systems and in creating urban planning capacity. Law (1994) and Lawson (1996) pointed out that even unsuccessful bids for the Olympic Games can have positive impacts on urban development through the urban projects and regeneration initiation that lead to strengthen the city's Olympic bid (Essex & Chalkley, 1998). Mega-events often contribute to urban transformation through changing urban space, namely through the construction of event-related infrastructures and equipment, as well as of new housing and retail developments (Hiller, 2000). The International Olympic Committee (IOC) has embraced this concept that host city investments in Olympic infrastructures should be positioned as part of an extensive urban agenda. However, the expectations of the Olympic Games as catalysts of a significant urban development have regularly fallen into decline (Long, 2013; Kassens-Noor & Lauermann, 2017).

Countries, especially developing countries, rarely have a chance to experience hosting several sport mega-events. However, Brazil is the only country among developing countries that hosted various sport mega-events. So, if mega-events are effective urban development tools, as countries claim, then Brazil that won the bid to host both the World Cup in 2014 and the Olympics in 2016, should evidence this positive trend. The history of sport mega-events in Rio de Janeiro initiated from 1993. At that time, the hosting of mega-events became a policy objective in the first strategic plan of the city. It considered events as a tool for urban redevelopment. Since then, the city hosted the 2007 Pan American Games and after the Games´ closure, the bidding process for the 2016 Olympics was officially launched. The city submitted three times (in 1996, in 2002 and in 2009) Olympics applications and succeeded

with the last application, in 2009. In 2013, the city hosted the FIFA Confederations Cup. Rio had both positive and negative event-led regeneration experiences in hosting sport mega-events.

This thesis explores positive and negative impacts of sport events in developing countries by proposing a sustainable model for hosting a successful event.

1.2. Research objectives

The main objective of this thesis is to examine the sport mega-events´ role and, especially Olympics´ role, on transformation of host cities.

In this regard and to answer the main question of the thesis project, the specific objectives of this research include the following:

- To review the scientific literature on sport mega events´ impacts on host cities in physical, environmental, economic and social-cultural dimensions;
- To assess, in more detail, the physical and environmental impacts of a sport mega-event on the host city;
- To investigate which planning process is followed in staging the mega-event;
- To research the ways of sport mega-event planning and implementation actions that lead to urban sustainability and promote urban quality of life.

1.3. Assumptions or hypothesis of the present research

The first steps in deductive research involve generating theories or hypotheses and then to arrange them in such a way that they can be measured through empirical observation. The next stages are concerned with the process of measurement and observation such that it can eventually be decided whether the theory or hypothesis can be supported or rejected.

The focus here, therefore, is not only on the empirical observation but also on providing a sufficient explanation of the relationships between holding a sport mega-event and sustainable urban changes.

Decision of hosting a sport mega-event especially Olympic Games in the developing countries is often rooted in the political goals. Events, in general and sport mega-events in particular, have become legitimate tools of governments. They mainly follow goals such as

putting the host city and country on the map and create good image of them. Likely, holding such events can impose huge costs on the host city and country. Therefore, in such circumstances, their hosting may not originate from the economic situations or urban development requirements of the cities.

Considering the various critical contributions that have been provided in the analysis of sport mega-events, this thesis takes on two hypotheses: i) whether sport mega-events enable to deliver sustainable urban development to the host city; ii) whether sport mega-events are able to improve the image of host cities in developing countries.

1.4. Strengths and constraints of the research

In the last decades, cities that hosted mega-events such as Olympic Games have presented vast urban agendas and put forward several types of commitments that far outreach the transitory ephemeral event. Therefore, from the perspective of urban planning it is important to examine the impacts of events on sustainable urban redevelopment in the host city.

The main strength of this thesis is that it helps to clarify the relationship between hosting sport mega-events and urban transformations especially their impacts on the built environment. Examining of event-related urban planning and management process through developing a sustainable sport mega-event model is also a significant strength of this study.

As mentioned in the Background section, Rio de Janeiro is one of the rare cities that hosted a number of sports events. This thesis in taking Rio as a case study, contributes to clarifying the role of sport mega-events in the sustainable urban promotion in Rio.

The research consisted in a three-fold assessment which included a quantitative analysis of experts' perspectives to examine Rio' Olympic Games in achieving the commitment goals for city redevelopment. In doing so for this city, the thesis allows and disseminates the use of the same kind of assessment tools for other host cities of mega-events.

It is worth noting that although, this thesis was carefully prepared and has met its goals, there were some inevitable limitations. This section also highlights them.

The first limitation concerns the difficulty to find a suitable methodology to assess the impacts generated by a sport mega-event because no single method worked for all aspects. Second, there is lack of available or reliable data and information of short-term and long-term (including pre-event and post-event phases) impacts in physical and environmental dimensions on Rio de Janeiro. This shortcoming is also due to the time limitation of this

thesis which made large-scale research impossible. Third, this study only investigated Brazilian experts' opinions about Rio host city. However, in order to understand the role of a sport mega-event and its likely positive impacts on the built environment and local residents, it would be relevant to survey Olympics-related impacts on local residents. But due to the lack of financial resources and time contrains, surveying the views of local residents who were direct or indirectly impacted by hosting 2016 Olympics in Rio de Janeiro, was impossible. In addition, I am limited in terms of the ability to read and interpret the Portuguese language.

However, the approach taken in this consideration, attempts to overcome these limitations by clearly engaging sustainability variables within an urban redevelopment approach which relates to a holistic sustainable sport mega-event urban model. My goal is not inclusive in the sense that I do not list all requirements and all changes that a sport mega event can bring to the host city, its environment and transport system. It is rather a step by step approach that narrows down the assessments to selected key criteria that allow conclusions to be derived.

1.5. Structure of the thesis

This study is structured in eight Chapters (Figure 1.1). Chapter 2 starts with a definition of sport mega-event impacts. Then, it follows a literature review on sport mega-events impacts (positive and negative) in physical, environmental, economic, social-cultural and administrative-political dimensions in developed and developing countries. Afterwards, a discussion about the experience of Barcelona Olympic Games as a successful games example will be presented. This review establishes the knowledge basis for thesis research. Chapter 3 presents the research questions, the data collection methods and the design of the expert's survey, as well as an explanation of the quantitative and qualitative analyses that are going to be employed in this thesis. Chapter 4 starts by looking into sport mega-events roles' in urban transformations. Then, it proposes a holistic model for sustainable sport mega-event. Then, a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of sport mega-event impacts based on literature review is provided. This model is assembled through the review of sport mega-events' impacts on host cities mostly located in developing countries which is discussed in Chapter 2. Chapter 5 provides a review on sport mega-events in Rio de Janeiro as a study area at first. Then it presents the characteristics of each Olympics zones in the city. Chapter 6 analyzes the results of the survey on mega-event impacts indicators related to the

physical, environmental, economic and socio-cultural dimensions. The results of quantitative analysis conducted among Brazilian experts about impacts of sport mega-event are presented in Chapter 6. Chapter 7 presents the discussions of the results of the expert's survey, with a discussion about the four zones of Rio de Janeiro Olympics, especially in relation to physical and environmental impacts. In the end, a comparative analysis of the degree of urban sustainability through hosting sport mega-event in Rio de Janeiro is presented. Finally, the main findings from all chapters are brought together in Chapter 8 - "Conclusion", in which the main research question is addressed: how can cities and urban planning benefit from sport mega-events to promote an urban transformation. Lastly, the final chapter also provides recommendations for decision-makers at the city level, urban planners and city authorities as well as for future practice in hosting a sport mega event to ensure a more sustainable urban planning and development.

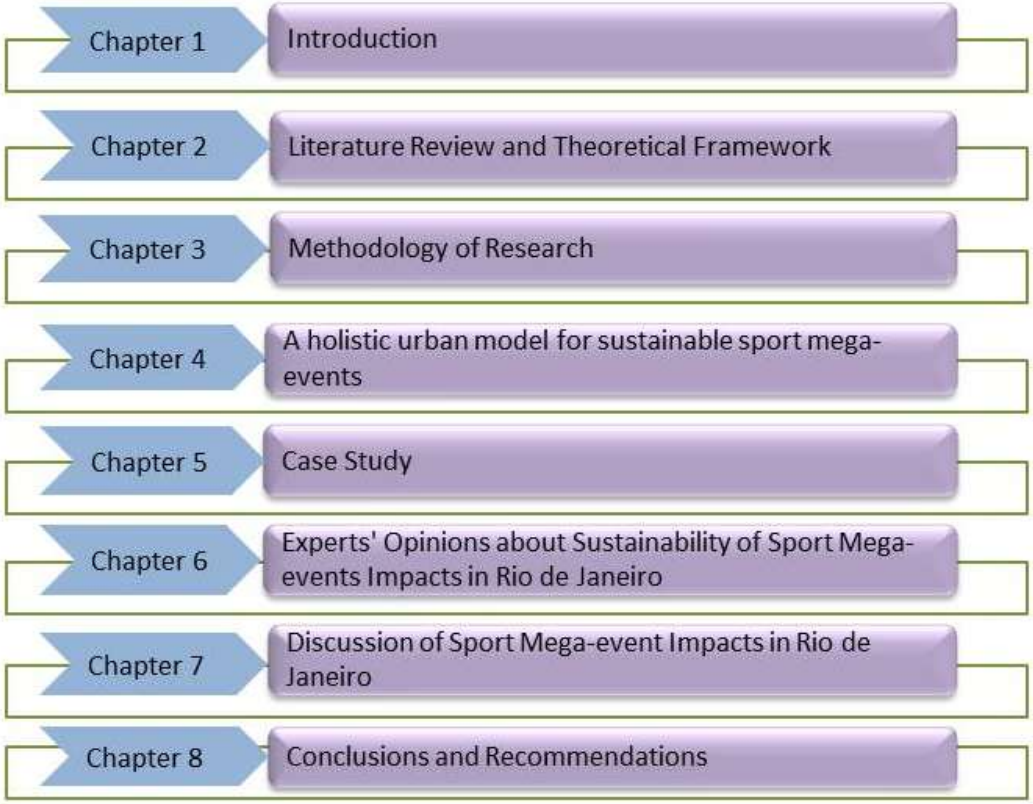


Figure 1.1: Chapter structure of the thesis

Chapter 2 : Literature Review

2.1 Introduction

Countries and cities compete strongly with one another to have the right to stage mega-events. Olympic Games are the most significant mega-event that has historically been held in industrialized countries. But, more than a decade ago, developing countries have increasingly demanded the right to host the Games (Greene, 2003; Matheson & Baade, 2004) and the International Olympic Committee (IOC) has encouraged their bidding.

Mexico City was the first developing country which held Olympic Games in 1968 (Matheson & Baade, 2004; Barclay, 2009). FIFA (French acronym for "International Federation of Football Association") shows greater tendency than IOC to award Football World Cups to developing countries, due to the existence of a rich football tradition in Latin America (Matheson & Baade, 2004).

In these countries, mega-events can be seen as a tool to achieve international political purposes and to allow cities and countries to position themselves in the world and to improve their international status (Andranovich et al., 2001; Broudehoux, 2007; Hlabane, 2012). Nevertheless, mega-events require enormous amounts of financial and non-financial resources to prepare and to host (Lamberti et al., 2011) and that is even more acute in the case of developing countries. The costs and benefits of a mega-event are matters of continuing debate before, during and after the events, although quantitative evaluations are not well equipped to capture all of their intangible effects. In recent years, several developing countries have hosted them while their cities are grappling with growing problems like informal urban expansion, a huge income inequality as well as lack of basic amenities, convenient public transportation and adequate urban infrastructures (Bukin & Skripnik, 2016). Therefore, in these countries, they may create more complicated challenges instead of leading to the city´s sustainable development (Eisenhauer et al., 2014; Dalonso & Lourenco, 2011 a,b. These facts have caused, in some cases, local protests against hosting the Games. For these reasons, in recent years, several cities have canceled their Olympic bids, and also bidding cities are facing a new political reality that is "whether a bid is in the best interests of local stakeholders" (Kassens-Noor & Lauermann, 2017; Lauermann & Vogelpohl, 2017).

This chapter begins with briefly recounts mega-event definitions. The following chapter aims to explore a deeper understanding of the sport mega-events' sustainability impacts in the developed and developing countries respectively based on the physical, environmental,

economic, social-cultural and administrative-political dimensions. Following this, Barcelona's Olympics as a successful experience is reviewed.

2.2. Mega-events definitions

Mega-events are identified with distinct features and broad impacts depending on host cities and on host countries. For this reason, this section presents the definition of mega-events applied in this thesis and it also introduces mega-events´ characteristics in order to better understand their features.

Researchers have categorized the mega-events according to different views but a principle that can be applied to all events is that they are temporary as stated by Bowdin et al. in 2006.

Roche (2002) classified events based on target market and media interest, determining three kinds of events as "mega": The Olympic Games, the World Fairs (EXPOs) and the World Football Cup. He illustrated different types of events based primarily on their form that is showing the obvious differences in their purpose and program, with the four categories based on temporal and spatial scale, such as: occasional mega events, periodic hallmark events, regional events, and local events. Albeit he has considered the differentiation of events on the scale of media interest, he did not consider the magnitude of involvement of the various organizations (national and local authorities), massive investment for holding events and the various effects of events on host city were also neglected.

Getz has put forward a comprehensive view of the events, first published in 2008 and reinforced in 2012, that mega-events vary in type, size, purpose, program and organization such as business (Conventions, large Conferences as related by Hiller (1995) to the size of the host city), sports (Olympic Games, World Cups such as the ones of foot-ball, soccer, rugby and cricket), cultural (Festivals, Fairs) and other events which attract large numbers of people including tourists and that yield extraordinarily high levels of tourism.

More recently, in 2015, Muller defined mega-events as "ambulatory occasions of a fixed duration that attract a large number of visitors, have a large mediated reach, come with large costs and have large impacts on the built environment and population". Mega-events are expected to affect whole economies and receive sustained global media attention according to several authors.

After reviewing these researchers' different definitions, this thesis addresses mega-events´ definition from a sustainable urban development perspective, considering their own unique features such as:

- being transient;
- an opportunity to attract global attention;
- a possibility to bring major urban changes and improve quality of life if following a sustainable framework which leads to mitigate negative consequences.

For operational reasons, this thesis focuses on Olympic Games because it is the most unique sport mega-event which is likely to lead to the biggest urban transformation in the host city. Because of the nature of the Olympics, other sport mega events such as FIFA World Cups, Pan American Games that involve sport mega facilities will also be analyzed.

2.3. Impacts of sport mega-event

In relation to mega-event study according to literature review, the impact can be positive or negative, tangible or intangible, certain or uncertain, direct or indirect, short-term or long-term. This section reviews the literature on sport mega-event, especially Olympics, impacts upon host developed and developing countries such as South Africa, China and Brazil. The impacts are independently analyzed in five sustainability dimensions: physical, environmental, economic, social-cultural and administrative-political, which are discussed starting with the positive and, then, the negative impacts.

It is noteworthy to mention that the impacts of hosting mega-events begin since the bidding to host and continue for years after they were held, following the scheme of Figure 2.1.

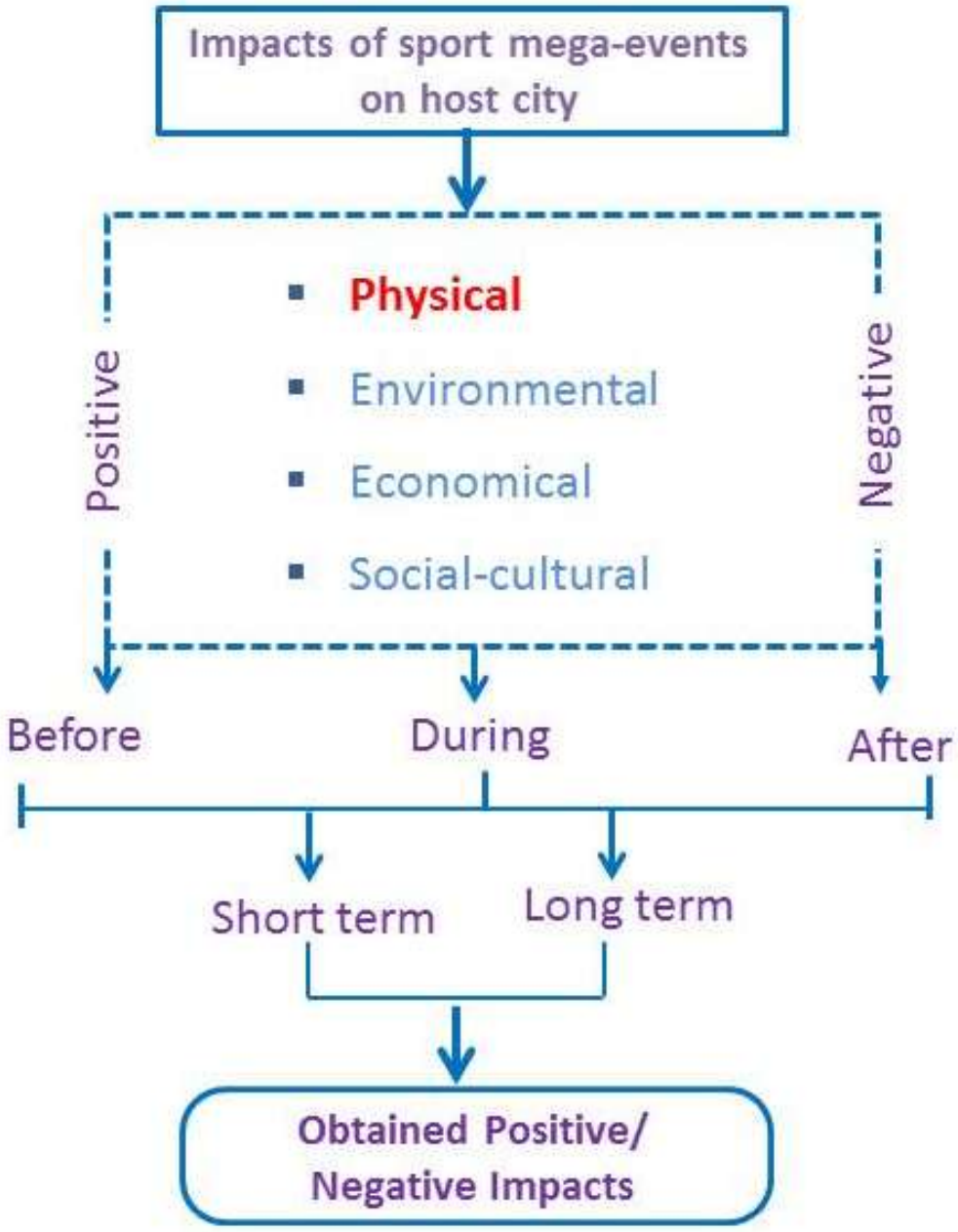


Figure 2.1: Types of impacts of sport mega-events

Source: Own work, 2018

The hosting of mega-events has been actively pursued by both developed and developing countries. However, they have different political and socio-economic structures and, of course, different urban governance. Therefore, event-related planning and management system in both country groups are fundamentally dissimilar. This chapter reviews the impacts of sport mega-events in both country groups in order to better understanding their significant differences in terms of event planning and management process. This detail and inclusive

review helps to identify the strengths and weaknesses of the sport mega-event planning and management system in the developing countries, which are the main focus of this thesis.

2.3.1. Physical impacts

- **Developed countries**

Olympic Games have played an essential role in the reconfiguration of urban strategies and were defined and recognized during the 1990s as a new urban planning instrument (Olmo, 2010; Caramellino et al., 2011). From urban perspective, they have been planned to be an effective tool in urban interventions and transformation (Austrian & Rosentraub, 2002). Many academics have emphasized the power of Olympics to accelerate long-planned urban redevelopment (Owen, 2002; Coaffee, 2007; Cashman, 2011; Kassens-Noor, 2013). The deadlines of hosting Olympic Games help to speeding up the process of changes, although, some of the changes may have been quite artificial, while, other changes such as transport facilities and sport infrastructure were actual (Hiller, 2000). They allow development efforts to be compressed of thirty years into five to seven (Coaffee, 2007, Pedranti, 2012; Kassens-Noor, 2013). In this way, decision-making processes, planning, management and control of urban development extremely were affected by sport mega-events (Rykwert, 2000; Caramellino et al., 2011).

Barcelona, a city belonging to a developed country, used the 1992 Olympic Games as a catalyst for future sustainable growth of city by using a flexible planning approach with the implementation of strategic plans (Qu, & Spaans, 2009) and, by selecting four areas all over the city that required profound urban intervention and public infrastructure improvement (Kindel et al., 2009). In this city, for example, stadia built for use at a mega-event could ensure a legacy for host city.

As positive impacts, sport facilities can be converted to other functions and be utilized after the Games. For example, the 1992 Olympics village of Barcelona converted into a fully functional suburb of the city with its own retail areas and port. Other examples showcase Los Angeles Olympic Games in 1984 as well as Atlanta after the 1996 Olympic Games, housing for athletes and officials transformed into residential facilities for students or other residents (Matheson, 2012).

On the negative side, most of Olympic cities did not have the sport facilities required to host the Games. Therefore, host cities build massive infrastructure and sport facilities. But, in absence of long-term planning objectives and strategic plans as well as building facilities without considering future use, after the Games, many of these structures remain underused or with little usage. Abandoned sports facilities can be seen at a number of different Olympics cities in the developed countries. As an example, in 1996 Olympics in Atlanta, Atlanta-Fulton County Stadium that was used for baseball Games, was demolished in 1997. The space was transformed in a parking lot with 4,000 parking spaces. 2004 Olympics in Athens is another example of a host city that built many facilities for the Olympics but did not adopt a strategy plan for post-Games spatial intervention. Lack of planning for the future use of infrastructures and facilities, caused most of them to be disused and abandoned are rarely used (Figure 2.2).

Moreover, developing the Olympic infrastructures in green fields or undeveloped sites in the city, lead to massive wasted urban spaces.

A: The destruction of Atlanta-Fulton County Stadium
Source: Atlanta Journal-Constitution,1997

B:Olympics, 2004 - Kayak and Canoeing venue, Athens
Source: Jack Crone, Mail Online, 2015

C: Olympics, 2004, Athens, Main swimming pool (left), The Olympic Aquatic (right)
Source: The Guardian,2014

Figure 2.2: Abandoned or demolished sport infrastructures after the Olympics

- **Developing countries**

Infrastructure development is frequently cited as one of the most important reasons why cities bid to host a mega-event (Barclay, 2009; Guala & Turco, 2009; Horne & Manzenreiter, 2006). According to de Melo (2011) less developed areas can improve the sport infrastructures, transportation and telecommunications through appropriate planning in hosting a sport mega-event. Therefore, those investments will benefit those areas and people who cannot afford to pay for those services. Furthermore, the deadlines of hosting the Games help to accelerate the process of change and the implementation of development projects (Coaffee, 2007; Hou et al., 2015; Kassens-Noor, 2013). The problem lies on that, although some changes may have long-term impacts on host city improvement, often the changes are mainly restricted to the event site and timing (Preuss, 2015).

On the negative, unsustainable use of sport venues (Vanwynsberghe, 2015; Kim, 2017), abandoned or rarely used sport facilities and costly maintenance (Humphreys & Prokopowicz, 2007) are the most debated consequences of sport mega-events in developing countries. Beijing's "Bird's Nest" sits mostly unused and also some stadia were demolished due to high maintenance costs with little post-Olympics usage (Ganguly, 2012) (Figure 2.3). In South Africa, stadia built for FIFA World Cups remain mostly unused (Matheson, 2012). Likewise, in Rio this has occurred in the past when inappropriate management led to demolish the poorly constructed venues from 2007 Pan-American Games, only a few years after their opening (Karl, 2015). The post-Games demand for sophisticated sports facilities does not pay back, argued de Melo (2011) as private initiative cannot afford to maintain them and it is usually hard to convert them to other functions.

In many cases, the mega sports facilities have acted as an obstacle to neighborhood improvement rather than promoting it as they are surrounded by parking spaces (Matheson et al., 2006, Matheson, 2012). The faraway location also bears a high risk of future capacity underutilization of the equipment (Matheson & Baade, 2004) and also of the built road infrastructure.

According to de Melo (2011), urban mobility was one of the weak points of the 2010 World Cup in South Africa. The constrains were caused by lack of integrated transport systems, insufficient transport planning and lack of information about new bus lines connecting Johannesburg city center with the stadia. All this originated an increased use of private cars, therefore creating even more traffic congestions.

A last negative point is that the advertised urban revival of deprived neighborhoods and informal settlements often forces evictions upon their inhabitants, as beautification actions and land are needed for the sport mega-event site (Davis, 2011; Steinbrink, 2014). For example, in the 2008 Olympics in Beijing, 1.5 million people were evicted (Barclay, 2009). Many of evictees have remained homeless due to receiving minimal or any compensation for their homes, and others were forced to move far outside the city. Top-down slum clearance has not been an effective way for urban regeneration in existing informal settlements, especially in cities facing severe housing problems. Time pressures help to strengthen and legitimize top-down decision making, having negative impacts on those who aren't financially, organizationally or socially in a favorable situation (Davis and Thornley, 2010).

Monitoring delivery of the approved schemes is a key factor in planning and implementation process (Vicat & Rooney, 2012).

Figure 2.3: Abandoned sport infrastructures after the 2008 Beijing Olympics

Source: Reuters /David Gray, 2012

2.3.2. Environmental impacts

- **Developed countries**

The environmental impacts of sport mega-events are difficult to evaluate quantitatively, due to complexity and their long period effects. Nevertheless, few studies have examined Olympic Games' environmental impacts. They may help to improve environmental regulations and standards. For example, Tokyo and Seoul used the Olympics as a stimulus to increase health standards within the city (Chalkley & Essex, 1999), to reduce pollution, to renovate sanitation facilities and to upgrade sewage disposal management and improve environmental standards (Jin et al., 2011), which would be acceptable by international level and media coverage (Young, 2012).

On the negative side, sport mega-events have potentially strong impacts on local ecosystems and non-renewable natural resources. They also help to increase carbon emissions-related to climate change (Collins et al., 2009). They may create more environmental problems (Lenskyj, 2000) such as pollution of beaches, lakes, and rivers, as well as the degradation of natural protected areas.

Transport, particularly air traffic, is associated to the big part of environmental effects related with long-distance tourism (Gossling, 2002) created by sport mega-events. Likewise, other negative impacts are derived from venues built for temporary duration and having to be demolished after the Games. Subsequently, many construction materials cannot be recycled and they will negatively affect the environment (Malfas et. al., 2004). This was the case, for instance, of Atlanta's 1996 Olympic stadium which was demolished after the Games ´closure, resulting in a large amount of material for recycling but there were also unrecyclable materials.

- **Developing countries**

Sport mega-events can help to increase environmental awareness (Deccio & Baloglu, 2002; Jin et al., 2011) and urban sustainability. According to Diederichs & Roberts (2016) measuring, reporting and compensating climate impacts have become central elements of greening programs of mega-events since 2006, offering a stimulus to decrease pollution,

enhance health, waste disposal management and environmental standards. The problem is that these improvements can be short-lived. In Beijing 2008 Olympics, the rapid reduction of the air pollution lasted for 14 days during the Games as a result of the special air pollutant emission control measures (Wang et al., 2014).

Impacts of most sport mega-events on environmental sustainability and on sensitive locations have been severely criticized (Greenpeace. 2002; Collins et al., 2009; Vanwynsberghe, 2015; Kim, 2017). In examining the negative aspects, there is a widespread lack of implementation of environmental goals. For example, the Local Organizing Committee of the 2010 World Cup in South Africa did not focus on the Green Goal due to lack of funding and coordination. The environmental programs comprised waste management and recycling, biodiversity protection, city beautification, public transport improvement and energy efficiency measures, among other, that were not implemented (Death, 2011; Dolles & Söderman, 2010; Preuss, 2013).

The visitors may generate negative impacts on the environment (Andersson & Lundberg, 2013) due to big carbon footprints associated with mega-events (Collins et al., 2009), overpassing 90% of a typical journey's contribution to climate change (Ahmed & Pretorius, 2010). As far as it can be researched, no documents were produced on climate change impacts namely on urban thermal environment, heat island and heat stress factors. This shortcoming is hardly understandable as these mega-events bear additional pressure on the environment through increased traffic congestion.

2.3.3. Economic impacts

- **Developed countries**

Some scholars stated that the Olympic Games likely bring significant positive economic impacts to the host city (Hall, 1989; Andersen, 2000; Lorde et al., 2011). Economic impact studies discuss the direct benefits of sport mega events hosting such as global investment attraction, tax revenues, employments, and additional sources of revenue (Travis & Croize, 1987; Hall, 1989; Long et al., 1990; Murphy & Carmichael, 1991; Kang & Perdue, 1994; Uysal & Gitelson, 1994; Deccio & Baloglu, 2002; Essex & Chalkley, 2004; Heyne et al., 2007; Kim et al., 2006).

Sport mega-events may enhance awareness of the host city as a tourism destination (Fourie & Santana-Gallego, 2011; Kirkup & Major, 2006), knowledge relating to the potential for investment and commercial activity, as well as generate job opportunities, provide economic growth (Travis & Croize, 1987; Ritchie, 1984; Malfas et al., 2004), long-term positive impacts on exports and trade of city or region (Rose & Spiegel, 2011, Song, 2010). For example, around 100,000 jobs were created to service the London 2012 Olympic Games, namely for small businesses and security (Wills, 2013).

Sport mega-events are also increasingly being used by destination markets as a tool to change or reinforce their destination's brand (Jago et al., 2003; Shoval, 2002; Chalip & Costa, 2005; Trost et al., 2012).

As mentioned before, sport mega-events can be considered as opportunities to expand skills level, experience of work and employability growth (Minnaert, 2012; Smith, 2009a). For example, since winning the bid to Olympics 1992, unemployment in Barcelona dropped and also the construction and housing industries have been revived. Likewise, investment in the city boosted and these tendencies continued in post-games period, as the city growth which was stimulated by hosting the Olympics was maintained (Kindel et al., 2009). Athens 2004 Olympics also had a positive impact on Greek economy. Unemployment decreased in the period of 1997-2012 and gross domestic product (GDP) growth was positive in that time (Kasimati & Dawson, 2009).

On the negative side, several scholars (Matheson & Baade, 2004; Matheson et al., 2006; Coates & Humphreys, 2002; Coates & Depken, 2006, 2009; Hagn & Maennig, 2008; Baade et al, 2008) in ex-post analyses achieved little correlation between hosting sport mega-events and real economic variables like employment, individual income (total and per capita) and taxable sales (Baumann et al., 2009; Baade & Matheson, 2012). Experiences of Olympics cities have revealed that they only create temporary job opportunities (Preuss, 2000). In addition, benefits gained during a mega-event may not be spent in the host economy (Matheson, 2012). Moreover, host city may run up into too many debts (Preuss, 2000). In fact, many authors state that there is no positive economic impact from hosting the events. For example, Sydney 2000 Olympics had a negative impact on the Australian economy (Madden, 2006; Giesecke & Madden, 2007).

It has been claimed that mega-events attract large number of tourists and cause economic growth of host cities. But they are generally held in large metropolitan areas with well-known tourism attractions that are already tourist destinations. Olympic cities such as Athens,

Barcelona and London always attracted many tourists each summer (the date of hosting the Olympic Games) even in the absence of sport mega-events (Mills & Rosentraub, 2013).

The economic impacts of hosting the Olympics tend to be less positive than anticipated: i) most cities after the games were faced with a huge debt (Wills, 2016); ii) in most host cities, job growth is much smaller than what the organizers claim. For example, Olympics led to a boost in employment in Los Angeles in 1984 and, Atlanta in 1996, but the number of jobs created was short term and disappeared one year after the Games´closure. In the 2002 Winter Games in Salt Lake City, the organizers were claiming it would create 30,000 jobs. It was more about 5,000 jobs, not 30,000 which were concentrated in the tourism sector (Baumann et al., 2012). In fact, these were temporary jobs created to serve for Olympics, not permanent jobs.

Furthermore, the Olympics may cause an increase in the cost of living (Preuss, 2000; Pillay & Bass 2008) and rental housing in a host city that do not reduce after the Games. As an example, hosting the 2002 Winter Olympic Games in Salt Lake City showed higher rental prices in its central city compared to the suburbs before and after the Games (Coates & Matheson, 2011).

- **Developing countries**

Spending on non-sports related infrastructure may provide future economic growth according to some authors (Matheson & Baade, 2004; Matheson, 2006, 2012; Baumann and Matheson, 2013; Negrusa et al., 2016).Temporary job creation is another reason to host an event as it is anticipated large access to jobs for unemployed, underemployed or cheap labor. Lastly, it is widely assumed that mega-events can boost tourism. For example, from 2008 to 2014, the tourism sector revenue in Rio almost doubled from the overseas market (King, 2016).

In reviewing the negative effects, the Olympic Games are the most expensive event that consistently costs more than anticipated. There is no evidence that massive infrastructure investments lead to long term economic growth (Bukin & Skripnik, 2016). Matheson & Baade alerted in 2004 that the necessary expenditure for infrastructure development will probably be much higher in developing countries due to the lack of the required infrastructure. It is a fact that the loans on expensive stadia are a heavy burden on cities and, most probably, the economic benefits will never return the money spent. The government in

developing countries is, usually, the only promoter in which case the consequences of poor planning and monitoring fall on public resources (Borchers et al., 2011).

2.3.4. Social-cultural impacts

- **Developed countries**

Hosting sport mega-events grows civic pride, especially in residents, and also bring a city and country together, create opportunities for residents to meet new people, boost the city's status as a tourism destination, helps people to learn other cultures and shapes national identity (Hall, 1989; Waitt, 2003; Kim & Petrick, 2005; Kim et al., 2006; Lorde et al., 2011).

Mega-events also can reinforce community self-esteem, residents' enthusiasm (Waitt, 2003), improve quality of life (Williams & Lawson, 2000; Haley et al., 2005; Coates & Matheson, 2011), increase community identity (Delamere et al., 2001) and enhance social and cultural opportunities (Spilling, 1998). Grounded on this, it is assumed that hosting a sport mega-event leads to enhance residents' self-esteem (Kim & Walker, 2012). For example, in Athens and Barcelona, the improvement of the transport system such as a new subway and a new tram lines to link the Olympic village with other districts improved the quality of life (Symes, 1995; Liao & Pitts 2006; Smith, 2008). In Sydney and London, also hosting the Paralympics caused awareness about disability (House of Lords, 2013), especially in relation to mobility, which meant a true change in alterations to transport planning and delivery (Darcy, 2003; Smith, 2008).

On the negative side, sport mega-events most likely generate social problems, increased namely in crime rates, traffic congestion and crowding (Bob & Swart, 2010; Ritchie et al., 2009; Prayag et al., 2013).

Likewise, Olympics may reduce the residents' quality of life (King et al, 1993). Affluent people often benefit from Olympic-related projects, while poor people bear the unfair burden of Olympic infrastructure, especially Olympic village development (Cashman, 2003; Lenskyj, 2012). As an example, Sydney Olympics led to intensify the existing housing gap (Lenskyj, 2012; Pillay & Bass, 2008). Generally, intervention areas for Olympic village usually lead to the displacement of existing underclass residents to middle-class (Hiller, 2000; Barclay, 2009; Silvestre, 2009) and also lead to marginalization of low-income residents which live in those areas (Smith, 2009a) and a disruption in the former social fabric.

Such displacements were observed in Atlanta and Sydney (Lenskyj, 2012; Silvestre, 2009). In association with local participation, as stated by Smith in 2014, previous examples have shown that Olympic-related regenerations often do not bring local participation. He also highlighted that complex communities and time limitations are considered as constrains for involvement at local level.

- **Developing countries**

A sport mega-event may enhance the image of the host city and be seen as a tool to exchange its culture. Hence, it can have a profound impact on nation building and increase national and international tourist flows (Barclay, 2009). It also encourages volunteering and has a positive impact on volunteering engagement in post-event (Minnaert, 2012; Koutrou et al., 2016). In addition, the transportation and urban upgrading can enhance the inhabitants' quality of life.

On the negative part, developing countries often have less positive images as a tourist destination compared to developed countries, coupled with low security perceptions. All this leads to fewer tourists as they worry about crime and health issues.

Poor neighborhood clearance programs may weaken the host city's ability to improve its image (Davis, 2011; Greene, 2003; Newton, 2009) as they increase poverty and social problems (Barclay, 2009). This intensification of unbalanced urban development between poor and affluent areas has often taken place in developing cities. As mentioned previously, for example the 2008 Olympics in Beijing, 1.5 million people were evicted (Barclay, 2009).

Furthermore, a mismatch can occur between mega-events programs and contemporary developing countries´ attitudes and travel culture.

2.3.5. Administrative-political impacts

Considering that developed countries do not face administrative and political impacts issues in hosting the Olympic Games, the analysis therefore examines this issue only in the developing countries.

- **Developing countries**

There is substantial agreement that sport mega-events, especially the Olympics, are not just about sport but it is also about politics (Andranovich et al., 2001; Hiller, 2006). Events allow cities and countries to position themselves in the world and to improve their international status (Hlabane, 2012). South Africa, for example, after the 2010 World Cup, was the only African country to enter the group of the emerging economies of Brazil, Russia, India and China (BRIC countries).

Hosting an event may also help establishing principles and regulations to increase decision-making efficiency as well as to establish public private partnerships in event preparation.

In developing countries, there is a higher level of national government involvement and single-center system in mega-events management (Black, 2007). Governments mainly follow their interests and political objectives in bidding and hosting these events. According to Pillay & Bass (2008), they are often used as tools to demonstrate hegemonic power. Authoritarian regimes use the event as an opportunity to showcase political stability and legal maturity (Greene, 2003), enhancing their credibility and to legitimize and strengthening the ruling regime and leadership.

Censorship, on one hand, is the way that authorities attempt to hide the social and economic inequalities (Caffrey, 2009; Minnaert, 2012), on the other hand, these countries must struggle against stereotypical media images as they are often projected in a negative light (Pillay & Bass, 2008).

Additionally, a common characteristic of sport mega-events preparations' is the imposition of exceptional and emergency planning conditions (Stavrides, 2008; Boyle & Haggerty, 2009; Gaffney, 2014). These conditions such as strict timeline, internationally imposed explicit and implicit events' requirements may enable public authorities to bypass local laws, political procedures, legal requirements and public participation.

2.4. Overview of the successful experience of hosting a sport mega-event– the Barcelona Olympics

This section provides a brief overview of Barcelona city´s successful experience in hosting a mega-event. The experiences from previous Olympics display that, at least in some circumstances, they can be a catalyst for significant positive change in the host cities. 1992

Olympics in Barcelona and 2000 Olympics in Sydney are the strong example of Olympic cities that successfully used the Games as a mean to achieve local objectives (Sivaev, 2012).

Barcelona is frequently considered by scholars (Coaffee, 2011) as a successful Olympics host city in using a sport mega-event for a major regeneration in diverse physical, environmental, social and economic aspects (Essex & Chalkley, 2007). The Barcelona 1992 Olympics was remarkable for its massive urban interventions and the use of Games to restructure urban space and social relations (Gaffney, 2013). It has become regarded as a model of urban transformation especially in the area of local powers for urban planners and event management for other European and Latin American cities (Monclus, 2003). Host cities like London and recently Rio de Janeiro were both inspired from the urban transformation model of Barcelona in planning and management for Olympic Games. For this reason, this section of the thesis is particularly focusing on the successful hosting of the Barcelona Olympics, with the purpose of introducing the principal characteristics of Barcelona event-related urban planning for hosting those games.

Olympic-related urban development strategies in Barcelona

Historically, in 1976, the General Metropolitan Plan of Barcelona revealed the city's international goal for hosting the event. It was the first city that used Olympics as a catalyst for urban transformations and city redevelopment. Barcelona’s regeneration began in the 1980s. The Barcelona's Strategic Plan Association was created in 1988 (Colantonio et al., 2013) to strengthen strategic approach for the investment in 1992 Olympic Games. The rebalancing of the city was achieved through public investment in deprived areas namely in building public squares, open spaces and schools throughout the city as a part of the planning for the 1992 Olympic Games. In this regard, the city presented a new planning approach for urban transformation. In this way, this approach was entirely integrated into the city strategic plan. According to Chen et al. (2013) the essential element about Olympics-related city planning was focusing on a long-term vision and strategic planning towards urban regeneration, rather than specific piecemeal interventions.

Characteristics of Olympic-related land use planning in Barcelona

In Barcelona, the urban intervention associated to the Olympics was concentrated on the development of urban improvement through primary small-scale projects (capacity to redevelop and improve central spaces) followed by large-scale strategic urban planning projects of later intervention (Monclus, 2003).

Using urban design to transform the city and express local culture was intensified during the Olympics through three specific strategies: i) protection of historic buildings in the city center, ii) development of flagship projects which was an opportunity to make an imprint on the city (Degen & Garcia, 2012), iii) open the city to the sea. Therefore, the old industrial port, inspired from waterfront redevelopment American models, was transformed into a leisure area, and el Passeig Maritim connected the working-class area to the new Olympic Village (Degen & Garcia, 2012). Barcelona waterfront regeneration was largely seen as a consequence of both the long-term planning and understanding of the relationship between existing and newly renovated areas of the city in the post-event period (Munoz, 2006).

The main reasons of Barcelona success in urban development through 1992 Olympics (Essex & Chalkley, 2007; Coaffee, 2011; Monclus, 2011; Davies, 2012) were as follows:

- Higher priority in urban regeneration than in hosting the Olympics;
- Olympic plans as partial spatial interventions integrated into the strategic long-term plans for the city as a whole, in order to meet long-term demands (Nello Oriol 1997; Garcia-Ramon & Albet, 2000);
- Olympic-related urban planning was focused on the redevelopment of brownfield, mainly in the old industrial area (Nello Oriol, 1997);
- The plan did not create posthaste to work just for the Olympics (Zimbalist, 2016);
- The Olympics planning process was conducted with public involvement;
- The Olympics planning provided a balanced development of public facilities throughout the city;
- Focus on creating a balanced and integrated Barcelona, without segregation, with social and territorial equality. It helped to integrate the marginalized areas;
- 83 percent of the total costs of the Olympics reported to non-sports facilities and general urban developments (Gold & Gold, 2008).

Barcelona, therefore, became successful in urban areas' interventions, improvement of quality of life by making the city healthier, reducing the negative impacts of the Games and,

ensuring the environment's short and long-term city integrity through hosting the sport mega-event.

2.5. Synthesis

This section reviewed the main impacts of sport mega-events and their contribution to urban sustainable development in developed and developing countries. Accelerating urban transformation, local interventions and also transport facilities improvement, are seen as important positive impacts on hosts. The abandoned or rarely used sport facilities and costly post-Games maintenance were the common physical negative impacts on the host cities, especially, in developing countries. In terms of environment dimension, increasing environmental awareness and urban sustainability have been considered as the most positive aspects of hosting sport mega-events. In opposite, generating carbon footprint associated with the mega-events is seen as the most negative impact of hosting the events. In terms of social-cultural dimension, improvement the image of the host city is the most positive impact on host city. In the opposite, low security in host city was seen as the most negative aspect of hosting the events in developing countries. In terms of economic dimension, on one hand, events have positive impact on global investment attraction and employments. On the other hand, as expected in most developing countries that held sport mega-events, huge expenditures on event-related large scale projects and sport infrastructures do not meet the needs of the majority of the inhabitants. Expensive new infrastructures are not aligned with sustainable objectives and remain a continual financial drain. Considering the unavoidable need to mitigate the economic negative effects, there is a real need to intake other financial resources particularly from the private sector since the beginning of the bidding process. Hence, prioritizing public investments should be carefully determined. If the mega-event is not properly managed and organized, it has the potential to leave a negative legacy with no real benefits for a host city. Indeed, the success of a mega-event depends on support from local government, local residents and the private sector. Barcelona Olympics show this while developing countries for reasons that have been mentioned in the previous sections can hardly display such capabilities. The literature review on sport mega-events indicates that holding them in developing countries without sound event management and urban planning will intensify the huge problems which they are face in several physical, environmental, economic and social-cultural dimensions.

Chapter 3 : Methodology of Research

3.1. Introduction

Research can be defined as an activity of systematic study of a given topic in order to add and upgrade the existing body of knowledge. It requires the researcher to understand the interrelated components of research design which refer to the purpose of the research and the theory that supports it, as well as the development of suitable research questions, methods and sampling strategies (Robson, 2006).

Chapter 2 critically reviewed the impacts of sport mega-events, in particular Olympic Games, on host cities in four dimensions among developed and developing countries. The most tangible impacts of the sport-mega events were associated with physical aspects.

Considering that the purpose of this thesis is to enhance and promote knowledge on the relationship between sport mega-events and sustainable urban transformation and quality of life promotion, the specific focus on this study will be on physical and environmental impacts of mega-events on host city. This research develops a case study of the Rio de Janeiro 2016 Olympic Games to investigate the claim.

The purpose of this chapter is to provide a full description of the steps involved in research of a sport mega-event impacts' process, ranging from the formulation of the research problem to the analysis and processing of data from literature review and experts' survey on impacts of the Olympics in all four dimensions of analysis. To achieve this aim, this chapter starts by identifying the research questions. Then, it presents the research methodology which is a description of the chosen research methods used within this study as well as the explanation of the procedure for conducting the experts' survey.

3.2. Research questions

As interest in hosting mega-events grows among countries worldwide, it becomes more essential for cities to understand appropriate urban development tools through consider the variables and factors that can make possible an urban strategy for such events that both meets event demands and achieves the city's sustainable development goals.

The main question of this thesis is: How can cities, especially in the domain of urban transformation and quality of life promotion, benefit from sport mega-events?

Thus, this study will be conducted to address the following questions:

- What are the impacts of sport mega-events on host cities?
- What is the role of a sport mega-event to stimulate urban redevelopment?
- How were the four urban zones influenced by the Olympics Games of Rio de Janeiro?
- What are the missed opportunities in urban redevelopment and policies due to Olympics´ hosting preparation?

3.3. Methodological steps

The proposed methodology is to analyze and compare a series of sport mega-events from the perspective of their impacts on local residents and urban areas and their role in host city's urban development.

The methodology to achieve the proposed objectives has therefore to be holistic enough to fulfill these objectives and is based on research methods, such as literature review, a questionnaire survey (focus groups techniques) and urban sustainability evaluation. Figure 3.1 illustrates the elements of this research process about hosting a sport mega-event.

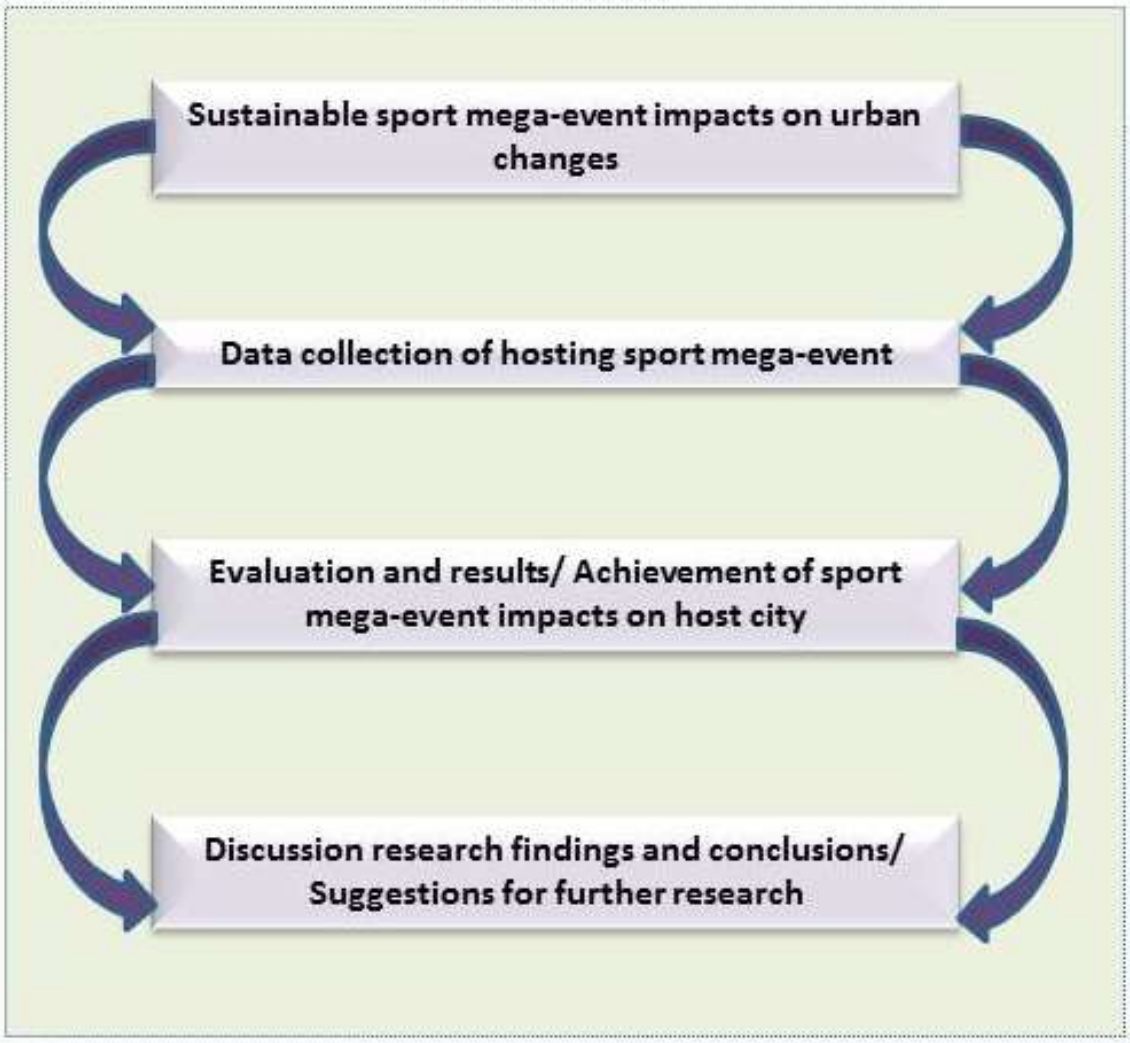


Figure 3.1: Elements of the research process of sport mega-event hosting

Source: Own work, 2018

The research was operationalized through the following steps. In the first step, this thesis presented an in-depth review of the literature of mega-event impacts initially through the university library b-on data bases and Internet search engines. The data collection and presentation was divided in developed and developing countries. This step also presents and explains the successful case study of Barcelona to foster the city's development through the 1992 Olympic Games. Chapter 2 evidences this step.

The second step depicted in Chapter 3, proposed a holistic model for hosting a sustainable sport mega-event. For reaching the holistic model, requirements of sustainable urban development features in hosting a sport mega-event were described in detail. The proposed model will be validated twofold: i) a literature review spanning from 1992 to 2015 based on a range of outcomes and impacts of the sport mega-events on developing countries, that can

provide a better understanding about the process of planning and hosting sport mega-events in developing countries; ii) a profound research of sport mega-events impacts in the four Olympic zones and in whole city of Rio de Janeiro (case study).

In the third step, after the study area was selected, the problems faced pertaining to holding sport mega-events as well as subsequent economic, socio-cultural and specifically physical and environmental impacts were analyzed. This section of the thesis was divided in two separate parts as below:

a) **Survey on Brazilian experts' views:** in this part, a questionnaire was prepared by extracting qualitative indicators from the literature review on impacts in the selected four dimensions including physical, environmental, economic and socio-cultural, and their corresponding factors.

The research methodology in this step consists in analyzing a questionnaire survey that was given to Brazilian experts to collect their views about sport mega-events' impacts in Rio de Janeiro. It employed both quantitative and qualitative methodologies.

Close-ended questions were conducted among Brazilian experts to obtain their views on the impacts in the four selected dimensions in Rio. These individuals were selected for survey purposes because of their professional status. They included academics in territory planning, tourism, civil engineering, as well as experts in the sport mega-event field from consultancies and public administration. This can be considered as one of the three main types of stakeholder participation as categorized by Soma et al. (2017) that is science initiatives. The survey consisted on listing probable impacts in each of the four dimensions in 12 to 17 questions. The quantitative evaluation was done through the assessment of the sport mega-events' impacts intensity, which was measured on a five point Likert-type scale as:

- 0.2= very weak
- 0.4= weak
- 0.6= moderate
- 0.8= strong
- 1= very strong

Eighteen questionnaires were successfully completed by the experts. The Delphi technique is used in this thesis for gathering and evaluating the answers given by the experts. This technique "is an efficient, inclusive, systematic and structured

method that can be used to address complex issues" (Mukherjee et al., 2015). Two statistical techniques were applied to evaluate the questionnaire results: one to explore the intensity of both positive and negative impacts (One-Sample Wilcoxon Signed Rank Statistical Test) and another to make an exploratory and descriptive analysis through the use of boxplots.

The One-Sample Wilcoxon Signed Rank Statistical Test was applied to analyze the results of the data collection from the experts' survey. This is a nonparametric test, usually used as an alternative to a one-sample t-test, especially when it is not possible to know whether the data follows normal distribution. The statistical analyses aim to explore the intensity of the physical, environmental, economic and socio-cultural impacts of sport mega events on host cities. According to the Wilcoxon One-Sample Signed Ranks Statistical Test, a hypothesis was set up and the level of significance determined. Thus, it was established the following null hypothesis for the four domains: H0 - A sport mega-event has a physical/ environmental/ economic/ social-cultural positive impact to the host city. The statistical test for the Wilcoxon Signed Rank Test is W, defined as the smaller of W+ and W-, which are the sums of the positive and negative Ranks, respectively. The critical value of W after the table of Wilcoxon Signed Rank Statistics' critical values is 47, for a sample size (n=18) and one-sided level of significance (α=0.05). Therefore, the decision rule is as follows: Reject H0 if $W < 47$ (i.e. reject the null hypothesis).

Then, boxplots were used as the statistical technique for presenting the sustainability impact intensity of sport events in Rio de Janeiro based on experts views. Boxplots graphics are useful for data distributions and comparisons of those distributions using a set of symbols as they display not only the median but also the interquartile range, maximum and minimum values and outliers of a data set.

b) **Description features of the four Olympics zones**: in this part the four zones where the Olympics took place, are analyzed and studied in terms of their location selection, planning for distribution of sports facilities in those areas, transportation system improvement for connecting them, event management system and costs of preparing each Olympic zone.

In the fifth step, sport mega-event impacts in Rio de Janeiro are discussed. This is presented in Chapter 7 according to the following three parts:

i) Survey results comparison with sustainability sub-themes for evaluation whether sport mega-events in Rio de Janeiro were sustainable or not. Therefore, a comparative approach was used for analyzing the degree of urban sustainability by hosting sport mega-events. In this regard, sustainability sub-themes have been adapted from the European Foundation's Urban Sustainability Indicators (European Commission, 2015) and International Urban Sustainability Indicators List - IUSIL, (Shen et al, 2011) and improved for increased relevance to sport mega-event context (Table 3.1). Full lists of these indicators are supplied in the Appendix.

Table 3.1: Sustainability sub-themes related to sport mega-event

Sustainability Theme	Sustainability Sub-theme
Physical	Sport infrastructures
	Urban mobility/ transport facility
	Green, public space and public facilities
	Sustainable land use planning
Environmental	Clean transport
	Air pollution reduction
	Noise pollution
	Waste reduction
	Minimizing of the consumption of environmentally harmful natural heritage
Economic	Economic promotion
	Long term employment opportunities
	Tourism growth
	Small business finance
Social-cultural	Poverty reduction
	Urban justice
	Urban safety
	Public health
	World-city status
	Urban tourism
	Social activities

Source: Sub-themes adapted from International Urban Sustainability Indicators List (IUSIL), Shen et al (2011) and European Commission (2015)

The results of the survey (impact indicators) are compared with the selected sustainability sub-themes (table 3.1) in order to identify the degree of urban sustainability of sport mega-events' impacts on host city. The range of sustainability is classified as below:

- -2 = extremely low
- -1= low
- 0= moderate
- 1= high and
- 2= extremely high

Their relationship is compared for all the aspects physical, environmental, economic and socio-cultural.

ii) The next part of the discussion consists on the assessment of the impacts of sport mega-events especially in the four selected 2016 Olympic zones in terms of its physical and environmental impacts.

iii) The third part of discussion presents the development of comparative analysis between the Olympics of Barcelona 1992 and Rio de Janeiro 2016.

The last step consists of the principal conclusions and the recommendations to achieve a more sustainable urban development in hosting future sport mega-events. Approaches presented in this study, can lead to sport mega-events hosting within a sustainability principles framework, in which case events may be considered as a catalyst for urban transformation. Policy recommendation is given based on the analysis representing a perspective approach of transforming the host cities within sustainability principles by using sport mega-events' opportunity. Critical recommendations are targeted towards leveraging the potential of events to bring sustainable changes in the physical, environmental and transportation domains to the host city. Figure 3.2 illustrates the methodology of the thesis.

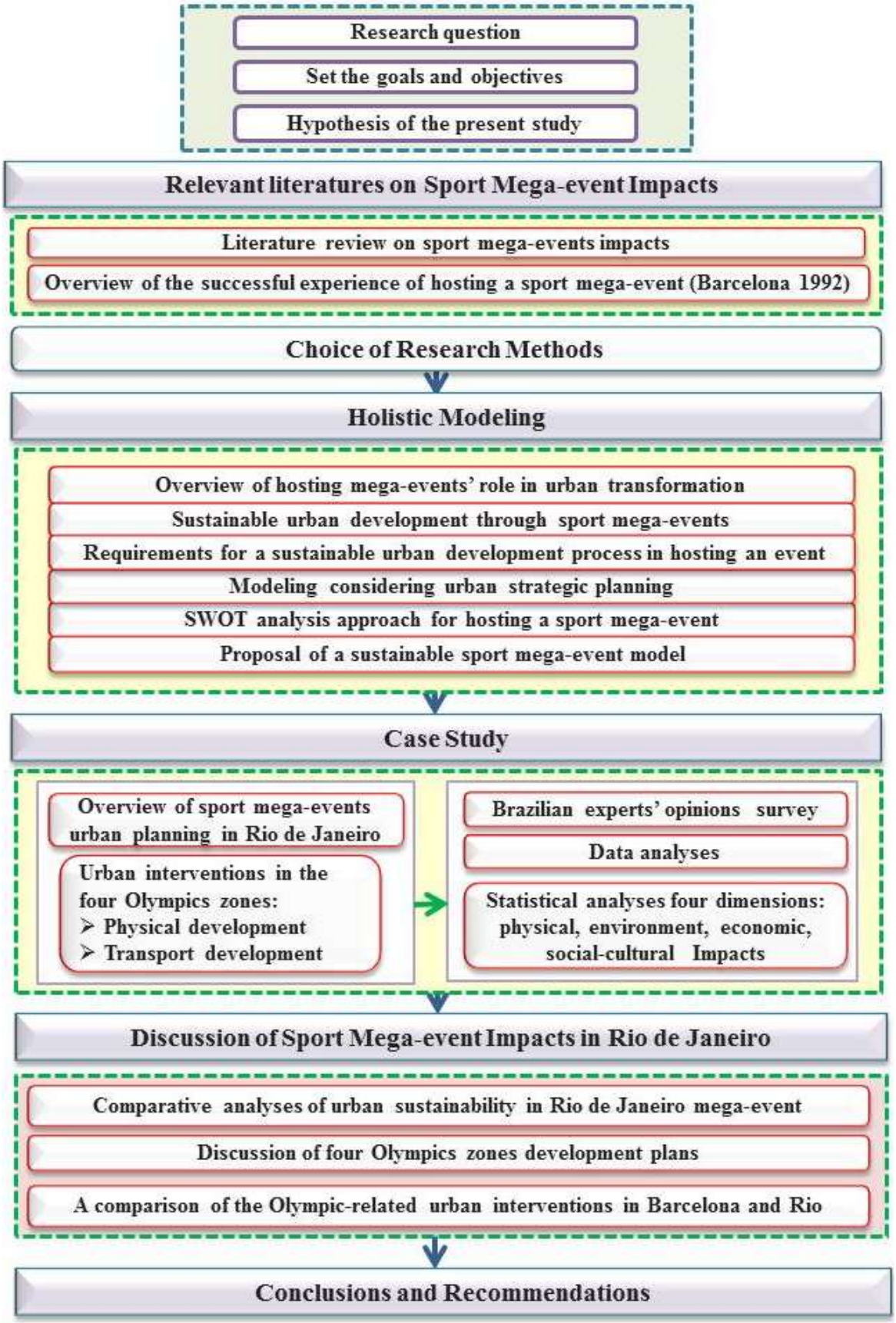


Figure 3.2: Summary of thesis methodology

Chapter 4 : A holistic model for sustainable sport mega-events

4.1 Introduction

Urban transformation is explained by urban development and urban change through drawing urbanization process in planning history (Roberts, 2000). Transformation is a long-term ambition that involves efforts to resolve problems in deteriorated urban areas (Boussaa, 2017). Roberts and Sykes (2000) described urban regeneration as "a comprehensive and integrated vision and action, which leads to the resolution of urban problems, which seeks to bring about a lasting improvement in the economic, physical, social and environmental condition of an area that has been subject to change". Urban transformation is often considered as a modern feature of the city (Clerici and Mironowicz, 2009). According to McCormick et al. (2013):

"Sustainable urban transformation involves understanding cities as a source of possibilities for sustainability, promoting active collaboration among various stakeholders, integrating different perspectives and bodies of knowledge and expertise, and stimulating experimentation with different solutions and approaches".

Therefore, based on this definition, transformation refers to structural change processes that can effectively direct urban development towards ambitious sustainability goals (McCormick et al., 2013). They also pointed out that it can be defined in two dimensions-drivers of radical change and multi-dimensional sustainable urban structures. Cities are influenced in diverse ways by large-scale transformation processes. They always change to adapt themselves with life changes. In the way of changes, urban sustainability problems are not necessary characteristics of urbanization, but can rather be considered as results of poor urban governance and planning (Rode & Burdett, 2011). The design of cities plays a significant role in relation to the impacts of urban sustainable changes. Sport mega-events are considered such factors that effect on design of the cities, and consequently urban life is direct and indirectly affected. If the objective of a host city is not merely hosting the Games as a one-off event but also to improve the city in a sustainable way, thus it should be determined what type of changes it supports (Chalkley & Essex, 1999; Hiller, 2006). The main challenge is how the mega-events contribute to the process of urban sustainable transformation, and how urban planners and managers are concerned with achieving long-term benefits through event planning and eliminating their negative consequences. Any host city requires taking action in concern with urban planning and urban management that enable the city to improve itself through hosting an event.

With this short introduction, from urban studies perspective, the aim of this chapter is to know how a sport mega-event is connected to urban transformations. Thus, the principal goal of this chapter is to develop a model for sustainable sport mega-events' impacts on a host city that covers most of the items related to objectives, urban development strategies and expected outcomes. After a short introduction to the urban transformation, this chapter begins with an outline of sport mega-events' role in urban transformation and features of a sustainable sport mega-event impacts including describing of strategic planning before and after the games, and an investigation to develop a holistic model for sustainable hosting a sport mega-event. Afterwards a SWOT analysis of sport mega-event impacts is explored in order to identify advantages and disadvantages of hosting these events in developing countries. The chapter ends with a proposal of a sport mega-events' impacts model which has been conducted through a literature review spanning from 1992 to 2015 on a range of outcomes and impacts of the sport mega-events in developing countries.

4.2. Overview of mega-events' hosting role in urban transformation

A review of the history of modern Olympic Games roles in urban changes revealed that mega-events' urbanization has obviously grown in terms of content, scale, form and complexity. Up to the post-Second World War period, the provision of sports and urban infrastructure was limited. Between 1896 and 1960, Olympics are characterized by small scale, poor organization and very little role in urban development. In 1960 Olympic Games in Rome sparked a new period in Olympic urbanization (Pedranti, 2012). Since 1960, the size of Games had grown and their characteristics have been changed in a large scale, high level organization, providing new sport infrastructures and improvement of transport infrastructure. Games also began to have many impacts on the local built environment through urban expansion during 1960-1970 and regeneration during 1980-1990 and also sustainable urban form around the turn of the century (Liao & Pitts, 2006). Since then, the trend began moving from adding new buildings and parks into a comprehensive transformation of the urban environment (Pedranti, 2012).Therefore, the Olympics has increasingly become as trigger for extensive urban improvement (Malfas et. al., 2004) and, therefore, a strong relationship has been created between the Olympic Games and city physical changes. However, the increasing scale of mega-events for host cities is associated with major risks along with potential opportunities.

Although, the idea of promoting urban development due to hosting Olympics has been applied since the formation of the first Olympic Games, but, urban development associated with mega-event hosting has passed its evolutionary period. The model has been changed from planning on competition facilities to a very broad scope of supportive construction (Liao & Pitts, 2006). City transformation has occurred in several dimensions, such as, physical, environmental, economic and social. Physical changes in urban environment are related not only with sport infrastructures, but also with transportation system upgrading, tourist accommodation development, urban infrastructures and facilities improvement (green spaces, urban spaces), telecommunications and environmental improvement. Hence, this chapter focuses on pre and post-event sustainable transformation of host cities in developing countries.

4.3. Sustainable urban development through sport mega-events

The following section provides a brief overview of the concept of sustainable development in sport mega-events.

The United Nations World Commission on Environment and Development (WCED) defined sustainable development as "development that meets the needs of the present generation without compromising the ability of future generations" (WCED, 1987). It is divided into three dimensions: economic sustainability, social sustainability and environmental sustainability (Moffatt et al., 2001).

Recently, steps were taken related to sustainable development in the 1992 Rio de Janeiro "Earth Summit". The "Agenda 21" was the program designed to accelerate implementation of environmental sustainable development. Subsequently, in 1995, IOC declared that the environment is an essential component of the Olympics. The Olympic Movement Agenda 21 aimed at its members to play an active role to promote sustainable development, mainly in relation to sport activities. In this regard, host cities were required to consider a discussion on a much wider range of local impacts of the sport mega-events by the IOC (Vanwynsberghe et al., 2013). For example, the sustainability commitments were added to the IOC Charters in 2005, and embedded in candidate city file in order to diminish or eradicate the potential damage of hosting the Games. Environmental sustainability studies related to sport mega-event emerged in the Sidney Olympics in 2000 (Olympic organizers claim that it was "the greenest Olympics ever") and since that time, sustainability gained a solid place in the

planning and implementation of the sport mega-events. Consequently, sustainable development has become significantly integrated into the goals of hosting mega-events (Hall, 2012).

The following sections will present event associated development strategies before and after the events as well as sustainable event hosting features.

4.4. City development strategies for hosting a sustainable sport mega-event

Olympics have potential to change and develop the urban structure (Solberg and Preuss, 2007). Over the past few decades, city development strategies associated with Olympics have evolved along with evolution of their planning, management and organization. Planning and preparing for hosting a mega-event often causes major changes at least in some areas of cities. One of the important issues in event-related urban planning is to understand how to plan and distribute to better serve the less developed cities' areas which need more improvement and positive changes. Focusing on specific urban areas to develop event-related infrastructures may cause inequality development between them and this negative outcome may be induced by spending public money. As previously explained, experiences about Olympic Games preparation in developing countries indicated unequal distribution of the Games benefits between different areas of the host city. This means that some groups of stakeholders benefit at the expense of others (Ziakas, 2015).

Achieving long-term urban sustainable development benefits from hosting a mega-event in developing countries is still challenging. One of the most obvious examples of benefits related to hosting an event is enhancing major structural changes in a city (Furrer, 2002). However, the experiences of some host cities indicate that they were unable to benefit from hosting events due to poor planning and management system.

Likewise, under-used sport-related infrastructures in post-event period and maintenance costs reveal this weakness in the process of sustainable event planning and management. Even if venues are used in post-event period, they are likely to downgrade existing facilities as less popular or even redundant (Smith, 2009b). Eliminating some sport facilities after the Games may diminish excessive future maintenance costs.

Strategic planning can play a central role in achieving sustainable urban development goals through hosting a mega-event. It is essential that cities revise and modify their existing development strategies to align with the development requirements outlined in the bid book

(Pillay & Bass, 2008). It is relevant to understand whether the strategic plan has been developed from formal planning and decision-making process or through a political way.

According to Essex and Chalkley (2007) the determination of whether or not hosting a sport mega-event is appropriate in generating urban sustainable changes, depends upon whose perspective is taken (for example, planners, developers, businesses or local residents). A sustainable mega-event must be perceived as a chance to face serious urban challenges in order to enhance development solutions and innovations which consequently improve the quality of most residents´ life (Furrer, 2002), along with the lowest environmental footprint. The sustainable transformation of an urban area is not an end in itself but a means to generate new dynamics in the city understood as a whole (Viehoff & Poynter, 2016) and, all lasting changes to the city can continue to enhance the city, long after the event left. The importance of mega-event plans integrating into city long-term urban development strategic plans is twofold. On one hand, it minimizes or prevents imbalanced distribution of event-related infrastructure in urban areas and promotes harmonious development between areas. On the other hand, it is possible to mitigate non-usable and abandonment of sport infrastructures and venues in post-event period.

Hence, hosting mega events from an urban planning perspective requires long-term planning processes which can be divided into two phases of strategic planning including: i) planning before the event (include bidding and preparing), and ii) planning for post-event period. In each phase, it requires urban development actions associated with the mega-event in order to achieve sustainable urban redevelopment.

4.4.1. Strategic planning before hosting the Games

Event management, in particular in developing countries, indicates a political process. Generally, city politicians and local officials, begin to connect the Games´ investments with city development. From a systemic point of view, there is a concern that organizations involved in strategic planning may be affected by politics and interests groups (Bramwell, 1997). The relationship should be established between staging mega-event politics and the urban development strategy. In this regard, urban development can be considered by local authorities as a city necessity (Lei & Spaans, 2009). Event-related urban development strategy can be evaluated by comparing the city´s ability to invest in another, possibly more effective, urban regeneration project (Bramwell, 1997). Sport mega-event opportunities and

limitations as well as its benefits or burdens must be shared by all host citizens (Furrer, 2002).

Chalkley & Essex stated, in 1999, that there has been an interesting shift from construction of purpose built sports facilities with low impacts on the host city to construction of sports facilities with wider urban purposes and large impacts (). In this regard, Olympic sites plan has been integrated into the long-term city development plans for being able to accommodate the post-event period. Following these trends, the Olympic sites have been located in areas that were recognized as being heavily contaminated by past industrial practices in Atlanta and Sydney, in old industrial port and wastelands in Barcelona, military bases and wastelands in Athens and in old industrial areas (brownfield sites) in London (Chen et al., 2013).

Sport mega-event construction can lead to spatial expansion of the city. Events can be used as an instrument for integration of isolated or marginal sites on the urban periphery. The desire to build sport facilities lays in its potential to revitalize targeted urban areas. The site selection for developing of event-related projects is the first step in event preparation process. The location of sport facilities can accelerate urban development or acts as an obstacle to the future development. If their location has been selected improperly they may not be used sufficiently in the post-event period and consequently, may create negative impacts on surrounding area and neighborhoods. Obviously, location can undermine scale especially when sport infrastructures are placed in areas with more important and strategic long-term uses (Long, 2013).

Re-using of decaying industrial zones and redundant brownfield sites for constructing of both sporting and supporting infrastructure allows such areas to be revitalized as integrated urban areas (Smith & Fox, 2007). Thornley (2002) considered four possible scenarios that can be identified concerning to the location of a sport facilities or new stadium with different consequences:

- In the city center: The extraordinary importance of this location is that it can take advantages of the public transport facilities available and creates interaction with uses of existing central area. The sport facilities can be motivated to bring hotel and restaurants and contribute to policies to promote the city center as a conference destination, a tourist location. However, the stadium or sport facilities may cause disruption of local residents in the city center.
- In the edge of city: Sport facilities development in a decay industrial area or green field site is an attractive scenario, particularly, if land values in the edge of city can be

converted to lucrative development such as luxury residential or retail trade. The new site mainly relies on highways and allows for better access by private transport. It could also cause less disruption to local residents and less congestion. However, such a change may not comply with the planning priorities of a city which is seeking greater sustainability and less dependency on private transport.

- In an inner city area: Sport facilities development in a brownfield site in the inner city can contribute to local regeneration. Therefore, this scenario would seem to satisfy most actors as new facilities can be expanded. It also causes less disruption to local residents and planning strategies for brownfield sites development and public transport improvement can be realized.
- In a deprived neighborhood: Building a new stadia and sport facilities in a deprived neighborhood has been identified as an area which needs positive intervention. It can be seen as a spark for a broader regeneration effort involving a whole range of other redevelopment initiatives.

4.4.2. Event-related development planning principles

Given all the principles and strategies of effective action in host preparing process, the critical question is which principles should be considered for promoting a sustainable healthy city. An host city needs to be consciously planned if its sustainability is to be addressed properly. The decision process to choose the location of the Olympic Park or other sport infrastructures should integrate the accessibility, convenience, flexibility and compliance with the principles of sustainability and quality (Musgrave & Raj, 2009). Fundamental principles of urban development planning associated with event-related planning should be followed for hosting a successful sport mega-event, such as:

a) *Urban safety:* It is often one of the priorities in urban sustainable development planning. In this context, utilizing of mixed land-use development, besides various urban planning goals, can be considered as a way to enhance urban safety and generate daytime and evening activities (Jacobs, 1961; Oc and Tiesdell, 2000; Jackson, 2003; Vorontsova et al., 2016). Mixed land-use pattern is an integration of different land-use functions like residential, commercial and recreational in an urban area or a neighborhood. Sport mega-events, especially Olympics, according to their nature concentrate on constructing massive sport infrastructures in some part of the

city, such as the Olympic Park, which is generally separated from other neighborhoods. Those areas mainly have activities in certain days and at specific hours, remaining empty especially at night. Likewise, post-Games, they may become dangerous and unsafe spaces. Thus, event-related infrastructure may not only have negative impacts on surrounding urban areas, but it may decrease safety of them.

Accessibility: The increasing interest in sustainable development has underlined the importance of accessibility as a key indicator to assess urban form. Accessibility is a location factor defined as the ease to access service and activities or specific destinations through the transport system system (Morris et al., 1979; Geurs & Van Wee, 2004; Abley & Halden, 2013; Litman, 2013; Florez et al., 2014; Venter, 2016; Boisjoly and El-Geneidy, 2017). These characteristics influence a persons' level of access to event-related infrastructures. Balance distribution is one of the measures in spatial distribution of activities. The measures describe the level of accessibility to spatially distributed activities within (30, 60, 90 and 120 minutes) travel time from origin location to access facilities (Venter, 2016; Pereira, 2018). A hierarchy of urban service distribution can be considered in the planning process. Accessibility, in mobility oriented planning creates a complex interaction between land use and transportation systems (Boisjoly & El-Geneidy, 2017). However, event-related infrastructure due to the nature of the mega events is constructed in the international level. On the one hand, regarding the limitations of this type of events, sport infrastructures cannot be equally distributed in several urban areas. On the other hand, concentrating event-related projects in one urban area may create an obvious imbalanced and inefficient distribution of urban public facilities, which impact on their functions and decrease their accessibility and usability in the post-event period.

b) *Integration:* Sport mega event-related infrastructures are mainly designed to serve in international level. Event requirements are imposed on urban planners and managers by external organizations, such as the IOC and International Sports Federations (Essex & Chalkley, 2003). Experiences show a lack of sufficient linkages between the mega event planning process and urban planning principles and, also having insufficient attention to post-Games period land-use planning and implementation (Cashman, 2003). Therefore, event-related development should increase connectivity, especially by walking and cycling (access by all inhabitants including disabled people), between residential districts and sport zones and all the surrounding areas. Integration between mega-event planning and urban plans is one essential element for

success of hosting a mega-event. In fact, it makes possible, increasing of post-usage event-related infrastructure through providing adequate attention to post-event period planning, management and implementation. Integration and interlinking between event-related infrastructures and transport facilities with surrounding areas enhance more usability in the post-event period and spread event-related development effects in the whole city.

c) *Flexibility and adaptability:* Flexibility is the ability of an urban space to respond effectively to change circumstances (Mandelbaum, 1978; Pasmore, 1994) and develop new adaptive strategies (Eraydin, 2013; Ardeshiri et al., 2017). Flexibility is also an important factor in sport-related development. New urban development and regeneration programs can demonstrate that they have considerable flexibility over a long period of time. They need to be built to be functionally as flexible as possible, especially in respect to the configuration of interior space, in order to facilitate future changes in use and avoidance of vacancies and maintenance costs. But sport mega-events such as World Cups and Olympic Games are one-off events. Often, the already mentioned mismatch between the International Olympic Committee (IOC) requirements and the host city desires and objectives, occurs. Hence, the city needs to adapt the IOC requirements to actual needs, securing long-term benefits. In this context, ad-hoc approaches in planning of the Olympic-related projects need to be avoided (Smith, 2014; Hartman and Zandberg, 2015). Adaptability has positive impacts on the post-Games use of sport facilities. In this regard, event-related infrastructure, such as the Olympic Park, is required to be flexible and adaptable in planning, design and construction so as to make it possible for re-use in the future. For example, they stage different types events whether sport or non-sport.

d) *Sustainability compliance:* Sustainability is an important aspect of event-related development. In recent years, the Olympic host cities have embraced sustainable development principles and have started a sustainable journey. Organizers must guarantee that the Olympics will be organized in compliance with the conditions issued by the IOC Executive Board and with sustainable development principles such as climatic changes, waste, biodiversity, healthy living (Guthoff, 2016). Therefore, sustainability should be effectively incorporated into the planning process. Event-related construction has to reduce energy consumption within that development. This goal should lead to the coordinated development of the entire city, and the

intensification of uneven urban development should be avoided. Furthermore, strong local stakeholders´ involvement is a crucial part to be aligned with sustainability principles. In addition, establishing a strong monitoring system is another key principle towards achieving positive sustainability impacts.

According to the Canadian Standards Association (2010) the principles of a sustainable event include: "ethical behavior, accountability, transparent engagement of the community and local stakeholders, positive benefits for the environment and society, accessible and inclusive setting safe and secure atmosphere and facilities for spectators, participants, and workers excellent customer client experience and a positive legacy (Hall, 2012)".

4.4.3. Strategic planning for post-event period

Another important issue in planning to host a mega-event is usability of Olympics facilities in the post-event period. Experiences have shown that the vast majority of host cities, were faced with post-usage sport infrastructure problems and it seems like it was mostly a waste of money. As Cashman (2006) highlighted that even Barcelona and Sydney both struggled in the post-event period, despite their Olympics were recognized as the most successful (Smith, 2009a).

It would be helpful to draw the plan of the post-Olympic landscape. The success of a mega-event depends on appropriate post-event usage of whole facilities that were developed for hosting the Games. As Hiller (2006) stated that after the Olympics, the use of event facilities must be re-evaluated and integrated into the fabric of urban life and the needs of its residents.

Host cities can improve post-usage event-related infrastructures and enhance long-term benefits by taking various strategies in planning and design of venues:

a. It is essential that the construction site of new sport facilities and locations be selected in the areas which provide easy access to potential local residents (and also people with disabilities).

b. The integrated sport facilities with city functions such as residential, commercial, recreational, cultural and other functions, through transport networks will guarantee the appropriate use of sport mega-event facilities and will attract local residents in post-event duration.

c. Providing master plan for major mixed use development of sport facilities in post-event duration. In this regard, planning needs to be more sustainable, more flexible, adaptable and multifunctional and with the possibility to convert the spaces, infrastructures and facilities to other required functions in order to post-usage.

d. Planning for the sport infrastructures should not be considered alone as it needs to be integrated with long-term urban plans, such as master plans and strategic plans (Chen, 2015) and interconnected with the surrounding areas.

4.5. Requirements for a sustainable urban development process in hosting a sport mega-event

In order to achieve sustainable urban transformation through hosting mega-events, urban planning should be an integral part of the event development process. Figure 4.1 shows the main elements of the urban development process of hosting a sport mega-event.

Event-related strategic planning process is seen as a deliberate process of explicit analysis and decision-making (Bramwell, 1997). Figure 4.1 shows how to conduct strategic planning process and how to plan strategically for hosting a sport mega-event. In this context, through a number of steps an event-related strategic plan process can be developed and then implemented. These steps begin from determination of strategic goals, followed by the specification of the strategies to meet the goals. In the next step, specific strategic objectives are identified and action plans are drawn involving the event management and organization, scheduling the urban planning activities and event preparation. The process continues with implementation of the plans. One of the vital steps in the planning process is monitoring and evaluation of the status of implementation of the plan. In each event-planning system, monitoring should be established to evaluate whether goals are being achieved according to the timelines specified in the plan. Following the steps of the event-related strategic planning process may lead to sustainable outcomes for a host city.

Figure 4.1: Main elements in event-related urban planning process

Source: Own work, 2018

After overviewing the associated principles that should be considered in an event-related urban and land-use planning, and also the explanation of the main elements of a strategic planning process, the main urban planning requirements are determined. Figure 4.2 shows the urban planning requirements in hosting a sport mega-event. These requirements should take place at various spatial levels. Decision-making for sport infrastructures location selection is an essential first step in the event planning cycle. Usually, there are many national organizations and public sector including urban planners involved in the site selection process. Selected location needs to have been assessed as a part of the city's long-term plans. The site selection process determines the certainty of the best potential location chosen for sport infrastructures and related facilities.

After selecting location, urban planning processes continue with two main phases including pre-event and post-event urban planning. The pre-event planning is divided into three stages: i) land use and activities planning, ii) spatial structure and urban landscape, iii)

transportation improvement. These planning activities should be carried out in accordance with the urban planning principles. As figure 4.2 shows, these main activities are breaking down into several required sub-activities. In the third phase, designated as Post-Event, event footprint assessment and development of a management system to reuse the event related facilities and to take care of their maintenance, are highlighted (Ziakas & Boukas, 2013).

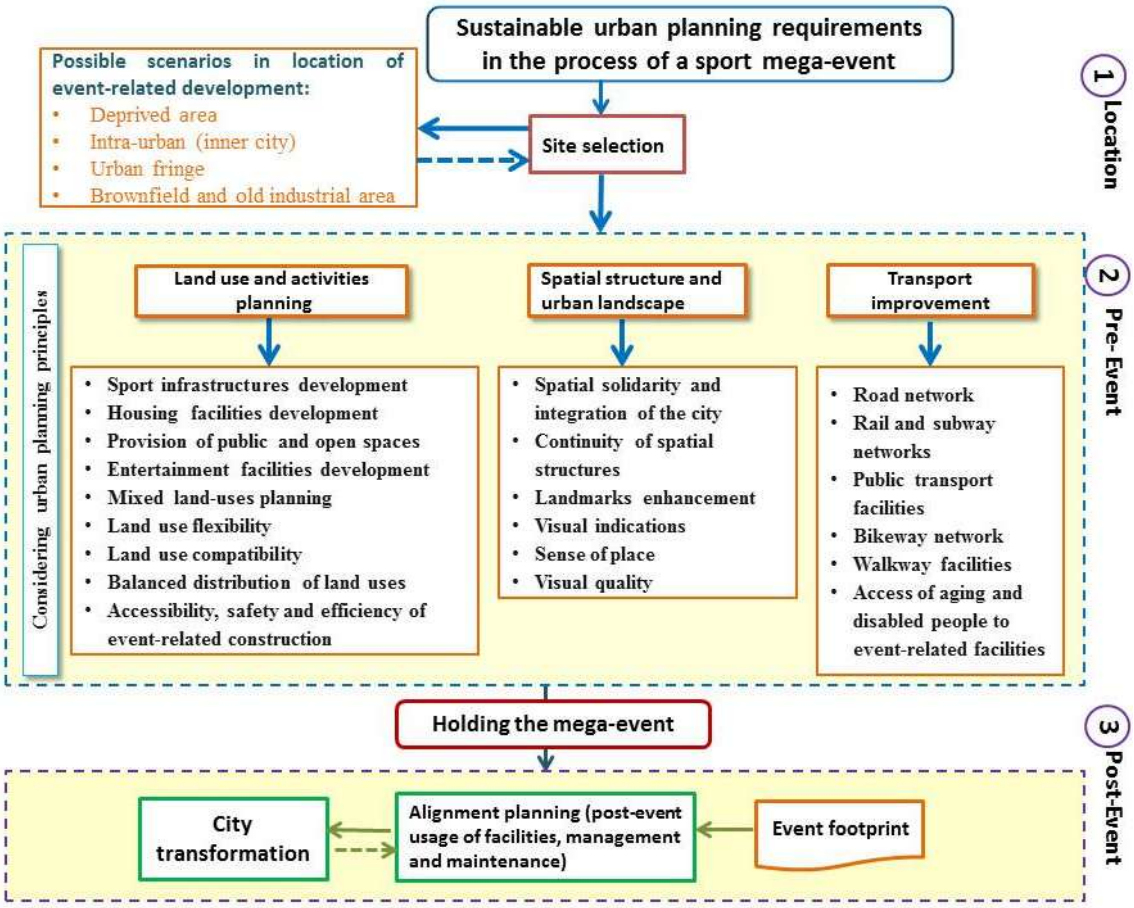


Figure 4.2: Urban development planning requirements in a sport mega-event

Source: Own work, 2018

Next section aims at developing a sustainable sport mega-event model and highlighting the mechanism in order to manage this process to provide urban sustainable development. It examines required urban development process in staging a mega-event.

4.6. Developing a sustainable sport mega-event model within urban strategic planning

The proposed sustainable sport mega-event model (Figure 4.3) illustrates an ideal complete process of hosting a mega-event incorporating urban planning and management as well as event organizing process. An explanatory model for sustainable sport mega-events can help prepare for more adjusted policies (Baroghi et al., 2017). It also helps to assess the influencing key factors to achieve a successful mega-event which includes the development needs of the host city.

Accordingly, the objectives are based on strategic planning before the bidding process, mainly originating from the city's development needs. There are involvements of all relevant stakeholders during the early stages of the planning phase, especially, community stakeholders. Stakeholder engagement increases overall accountability and transparency in the planning process. After winning, the implementation of the strategic plan starts-up at the same time as preparing the event, while the monitoring and control system is set to oversee the planning and implementation processes. The monitoring process determines whether the event objectives are achieved or not, and it evaluates the alignment of the identified objectives with host city development plans. The monitoring will continue until the completion of the implementation. Planning for post-event period simultaneously begins with planning for hosting a sport mega-event. This phase is often one of the most important phases in event planning. When Games close, the process of post-event utilization management should start up immediately.

This process of post-event planning can be focused upon the affected communities. Subsequently, the negative impacts can be mitigated. As the figure shows, following such iterative and bottom-up approach seems to be a safer guarantee of success of the event with positive achievements and more public satisfaction. Ultimately, it is beneficial for a host city to follow such a holistic sustainable sport mega-event model with an urban strategic plan that fosters sustainable urban development to be materialized.

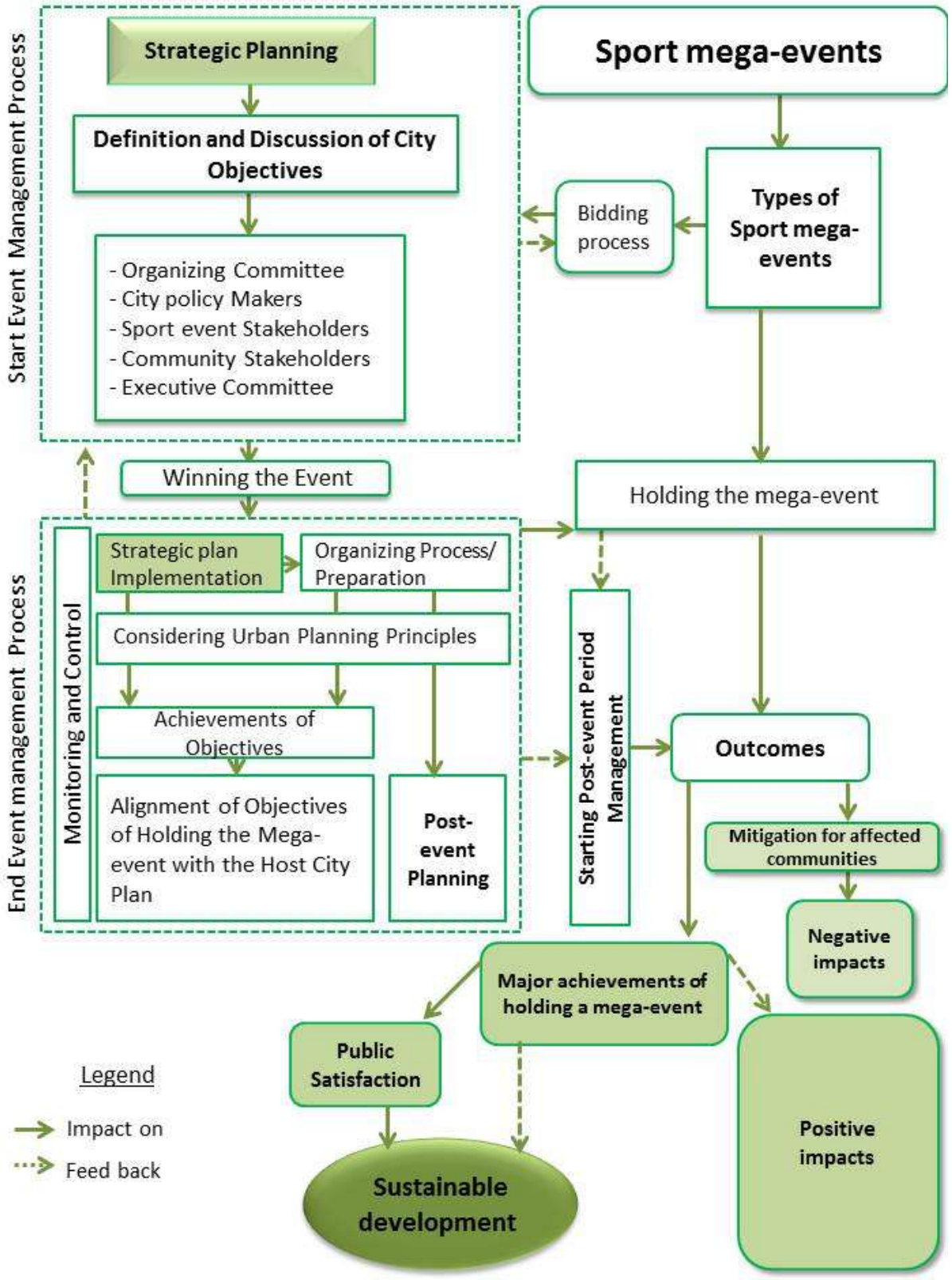


Figure 4.3: A sustainable sport mega-event model

Source: Own work, 2018

4.7. A SWOT analysis approach for hosting a sport mega-event

Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis are commonly used to establish the level of understanding needed for a successful plan. This study identifies a SWOT analysis of hosting a sport mega-event in terms of urban development aspect, based on literature review in developing countries, presented in Chapter 2. A host city can use these event-related urban planning experiences for the future event planning. Table 4.1 illustrates a SWOT analysis approach for hosting a sport mega-event.

Table 4.1: SWOT analysis approach for hosting a sport mega-event

Strengths (S)	**Weaknesses (W)**	**Opportunities (O)**	**Threats (T)**
- Event provides a focus to regeneration initiatives and coordination of local policies - Powerful stimulus for transportation system improvements - Possible long-term benefits of infrastructures improvement in the host city - Development of new facilities and accommodation buildings - The Olympic area benefits from the improved transport links and infrastructure associated with a	- Uncertainty about post-event planning for use of sport infrastructures - Sports facilities are difficult to convert to other functions in post-event duration - Transportation system improved requirements may not meet the city's needs - Giving priority to development of urban projects that are not essential to city - Absence of long-term planning goals and strategic plan for holding a mega-event -Displacement of local residents who live in Olympic sites or new stadia location far away with lack of facilities and access to public transport in relocation sites - Shifting the problems to other parts of the city through	- Sports infrastructure development enables a city to host several mega-events -Accelerating the development through the deadline of the event -Attraction of international luxury sports event	- Possible conflict between local development needs and event requirements - Event transport improvement requirements in some urban areas imposed by international organizations (*e.g.* IOC) -Many of event requirements are externally imposed by international organizations (*e.g.* IOC) -High risk of future capacity underutilization due to few world sport mega-events to attract in the future -There is no demand for sport infrastructures which makes the investment in sophisticated sports facilities pay back -Lack of private (national and international) organizations

new facility - There may be significant long-term benefits from schemes to improve city infrastructures - Less developed areas can be improved through planning on sport infrastructure and modern transport - Powerful stimulus for urban infrastructure	replacing slums -Urban facilities development may have limited effects on less affluent people that are pushed away -Spatial interventions are incompatible with neighborhood requirements - Postponement or elimination of some urban projects development -New development may cause replacement of working class in favor of new higher class -Some physical changes are temporary and purely cosmetic with using protection such as fences and walls to hide the squatter settlements -Abandoned urban area due to useless or underused sport infrastructure -Heavy construction of public facilities that are not essential or too luxurious - Costly sport facilities maintenance - Exceptional planning conditions and state of emergency may enable organizers to bypass legal requirements and public participation		that can afford to maintain sport facilities in post event duration

Source: own work, 2018

4.8. Proposal of a sport mega-event model

The proposed sustainable model was conceived and is assembled through the literature review of sport mega-events' impacts on host cities located in developing countries which was discussed in Chapter 2. It is visually summarized and illustrated in Figure 4.4. It indicates that staging events has brought a lot of negative consequences to cities. It also identifies the existing weaknesses in the process of hosting. The host cities often have faced massive construction projects for many years, debt accumulation and poor people´s eviction, in most cases with little gain. Lack of alignment between the goals and the city's development plans produces a vicious cycle in bidding, management, organization and implementation process. This vicious cycle can lead to undesirable results on the urban redevelopment and that it will most likely be repeated in future events, seems to be a major conundrum.

The model portrays the Impact Research Intensity level conducted through literature review. Therefore, the areas representing each of the studied categories of impacts vary in size of mapping these differences between the several positive and negative impacts. Understanding what factors are essential in the hosting of a successful event can help the mega-event committees to accurately evaluate the advantages and disadvantages of events, and pursue the methods which reduce the costs and enhance the benefits. Indeed, the desire to host events needs to break out of the vicious cycle of planning and management system. There are no objectives originated from the host city development needs to provide a base on strategic planning before the bidding process. There is also no involvement of community stakeholders and public participation in the planning process. There is, on one hand, lack of alignment between mega-event holding objectives and the city development plans. On the other hand, there is lack of a strategic plan and also monitoring and control in event procedure and preparation. Post-event planning is either not available or very incomplete. There are lack of alignment between the objectives of holding the mega-event and the host city development plans. Therefore, holding an event brings little positive impact in all dimensions (physical, environmental, economic and socio-cultural). In fact, a mega event can create a lot of negative impacts on the host city and little mitigation. Holding mega events without strategic plans or their incomplete implementation, top-bottom planning, delay in infrastructure construction and increasing debt and tax, bring little achievement. Therefore, such a

misplaced planning which is mainly based on political objectives brings public dissatisfaction as has been occurring in many host cities in developing countries.

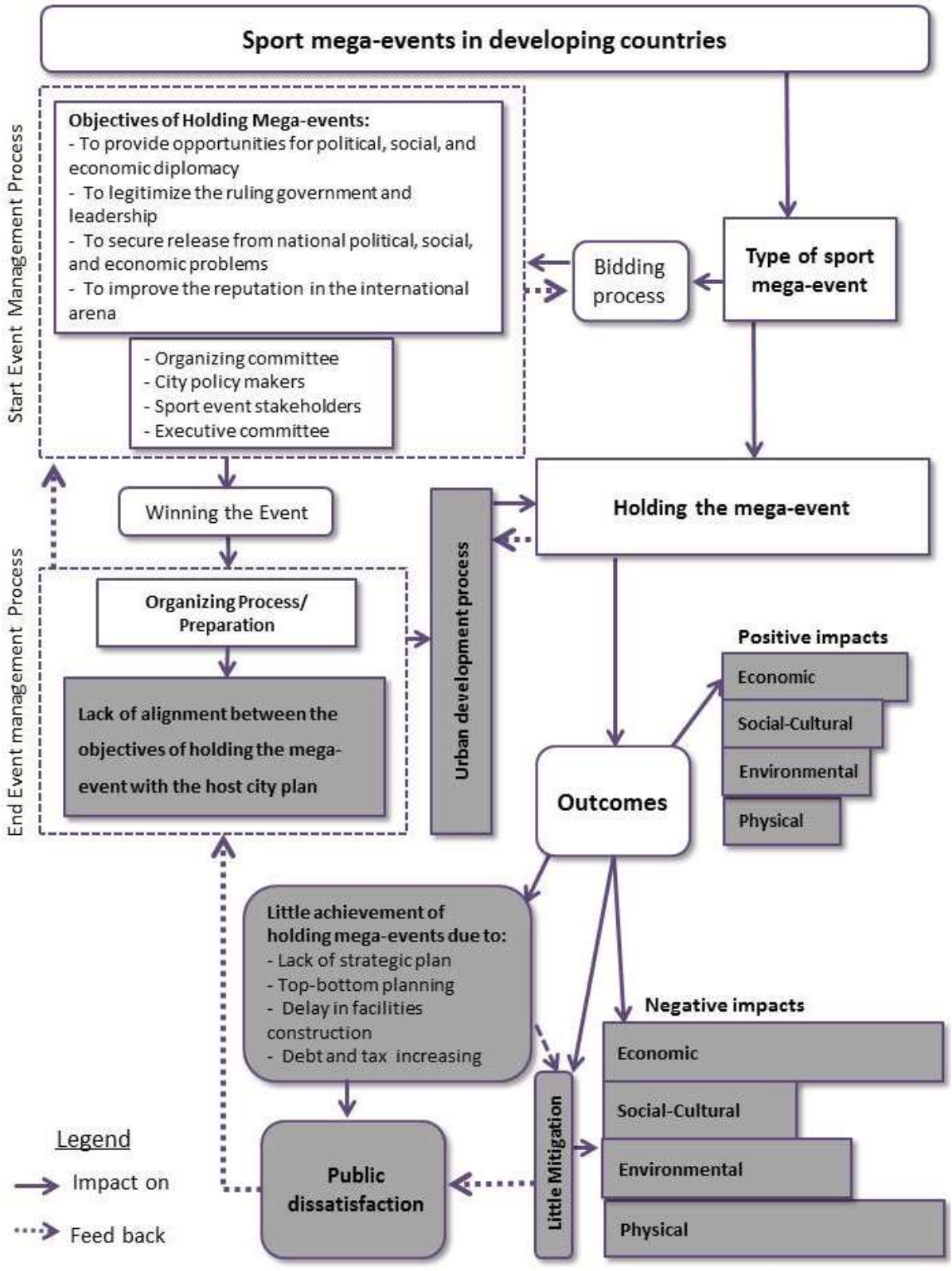


Figure 4.4: Sport mega-event model as assembled from literature review

Source: Own work, 2018

4.9. Synthesis

In this chapter, the sport mega-events' role in urban transformation and the features of a sustainable sport mega-event impacts have been reviewed. In order to achieve sustainable urban transformation, urban planning should be an integral part of the event development process. This is emphasized on long-term planning processes from the urban planning perspective in hosting an event which were examined in two phases: i) including strategic planning before the event and ii) planning for the post-event period. It has been explained that each phase requires urban development actions associated with the mega-event in order to achieve sustainable urban redevelopment. The chapter continued with a description of the fundamental principles of urban development planning associated with event-related planning. It also argued that in order to achieve a successful sport mega-event hosting, principles such as: urban safety, accessibility, integrating event-related infrastructures and transport projects to city long-term spatial plan, flexibility, and sustainability compliance should be considered.

By providing the main elements of strategic planning, it has also been argued how to develop strategic planning for hosting a sport mega-event and how to conduct a strategic planning process related to event planning. Likewise, the chapter described urban development planning requirements and the main activities and several sub-activities.

This chapter proposed a holistic model for sustainable sport mega-event hosting through presenting an ideal complete process that incorporates urban planning, event management and organizing process. It identified key sustainable features in mega-event planning.

This chapter identified a SWOT analysis of hosting a sport mega-event in terms of urban development aspect. According to this analysis the main Strengths, Weaknesses, Opportunities and Threats of hosting a mega-event are as follows: powerful stimulus for transport improvements, uncertainty about post-event planning for use of sport infrastructures, regeneration initiatives and coordination of local policies and possible conflict between local development needs, and event requirements, respectively.

After a SWOT analysis, the holistic model was evaluated considering the impacts of holding sport mega-events located in developing countries which were discussed in the theoretical section.

Overall, the validated sport mega-event model displays the existing limitations in event planning, management and organization processes in a typical developing country. There are obvious contradictions between sustainable development and hosting mega events, especially the Olympic Games. The application of the proposed holistic model for hosting a sustainable sport mega-event can lead to shifts in management and organization processes by policy makers and local authorities in particular. The inappropriate planning which largely creates public dissatisfaction has occurred in many host cities in developing countries.

Chapter 5 : Case study

5.1. Introduction

Sport mega-events are seen as a strategy to stimulate or justify a local development (Andranovich et al., 2001) that becomes a tool of urban politics. Hosting requirements set by the IOC have become more demanding, posing significant challenges for decision-makers and local planners due to the introduction of completely different development prospects and agendas (Essex & Chalkley 2003). Local planners should plan events, while remaining sensitive to the local context and also within a sustainability framework.

Rio de Janeiro had already held a number of sport mega-events namely the Pan American Games in 2007, the Confederations Cup in 2013, the World Cup in 2014 and the Olympic and Paralympic Games in 2016. The Olympic Games in 2016 was the most significant sport mega-event.

The origin of 2016 Olympics Rio lies in the policy exchange that took place between Rio municipality and Barcelona during the 90s (Gold & Gold, 2016; Silvestre, 2013). In 2009, Rio de Janeiro was chosen to host the 2016 Olympics. The bid for the 2016 Games was detailed and complex, encapsulating a phenomenal range of development goals according to Gaffney (2010). Brazil with hosting the 2016 Olympics was seeking to improve the global image of country and encourage sustainable social and urban transformation by means of sport, contributing to the growth of the Olympic Movement (Rio 2016, 2013).

This chapter provides an investigation whether cities are enabling to successfully achieve the urban development goals through sport mega-events as claimed by city authorities. In this regard, Rio de Janeiro was selected as study area to examine the impacts of sport mega-events, in particular 2016 Olympics on the city, since this was the last hosting city from a developing country that was responsible for organizing such type of events. The following criteria were taken into account when selecting the case study area: i) Olympic Games were selected among the sport mega events, as they are regularly taking place in metropolitan areas where their scale, popularity and massive investment in host city infrastructure allow for larger physical and environmental changes; ii) cities that have hosted various sport mega events in their history to better analyze their consequences; iii) main focus on the physical and environmental impacts of Olympics in a host city of a developing country.

The first section of this chapter seeks to outline a brief history of urban planning and urban development process in Rio, identifying the sport mega-events, especially Olympics, as the central element in changing the city's planning philosophy. The emphasis in this case study is on the event-related planning of both sporting, supporting infrastructures and

transport improvement for 2014 World Cup and 2016 Olympics and impacts of such planning strategies. After a short introduction to recent urban planning in Rio de Janeiro, there follows a description of development projects and plans associated with World Cup and Olympics. The chapter concludes with a summary of the role of different institutions such as decision-makers, event managers, organizers and other stakeholders in event planning process.

5.2. Rio de Janeiro urban planning to stage the Olympics

The urban structure of Rio de Janeiro city is strongly influenced by its morphology including forests, hills and the ocean which divide the city into poorly interconnected parts. This division is also visible in the city's physical and social structures. The city is divided into two parts: wealthy and less affluent areas that are respectively located in South Region (South Zone and Barra da Tijuca) and North Region (City Center, North Zone and West Zone). For this reason, Rio de Janeiro depicts a special situation concerning urban form and transport networks. This urban pattern seems to have been lacking sufficient urban infrastructure and equipment in unconsolidated settlements (slums), which are mainly located in rocky hillsides and riverbanks.

Rio de Janeiro´s urban development was based on several plans, programs and projects. Many of the proposed plans have not been implemented but the basic Urban Development Plan was implemented in 1977 (Brandão, 2006). Examining the city's new urban policy orientation shows that, in the period of the late 1980s to the mid-1990s, urban planning activities influenced urban politics that had real impacts on urban transformations (Sanchez & Broudehoux, 2013).

Rio de Janeiro has experienced urban transformation in various urban areas as part of the preparation process to host a series of sport mega-events. According to Sanchez and Broudehoux (2013) in the 1990s, planning activities of the city were limited to the promotion of adaptive strategies serving the real estate market and the privatization of public services. The Master Plan of Rio de Janeiro was developed in 1989 and implemented in 1992 (Viehoff & Poynter, 2016). Although, urban restructuring for different urban areas was the main feature of the Master Plan, from 1996 onwards, absence of reference to the Master Plan begun and gradually it was set aside as a reference and planning tool (Sanchez & Broudehoux, 2013).

In 1993, the Strategic Plan of Rio de Janeiro was prepared with cooperation of municipality and private companies, business associations and in consultation with an urban planner (Jordi Borja) from Barcelona. It was approved in 1994 without democratic channels of participation (Vainer, 2011). It became the main urban policy instrument of Rio de Janeiro's authorities. The consulting services of policy-makers from Barcelona, which immediately initiated after the 1992 Olympic Games, were a first trigger to bid for Olympics as a tool for urban development (Horne & Whannel, 2016). Rio´s Strategic Plan, inspired by 1992 Barcelona Olympic Games, emphasized the big potential of projects and mega-events in branding Rio de Janeiro as a tourist destination, for foreign investment and transforming the city into a world city (Braathen et al., 2015). Rio Strategic Plan considered the realization of the Olympics as part of the city goals which could be capable of promoting structural changes in the city. Unlike the Master Plan, the goals of the Strategic Plan were based on business demands and to make the city more attractive on the international market (Braathen et al., 2013). The Strategic Plan initiated a trend of entrepreneurial urban governance in Rio. As Harvey (1989) highlighted such close cooperation between the municipality and private sector tends to transform the city form and urban governance towards urban entrepreneurship (Braathen et al., 2015). This new strategic planning was named ad-hoc urbanism or company city (Vainer, 2011). It united public power and private actors around a market-oriented agenda (Vainer, 2012). Such a process created a barrier for the city to use its capacities to take advantage from mega-event opportunities to urban transformation, which could be observed in the preparations for the 2014 World Cup and 2016 Olympics. Broudehoux (2013) stated that "the Strategic Plan committed to restore tourism as the city's natural vocation and to insert Rio in the circuit of sport mega-events as a viable way to give visibility to the city and attract inward investment".

Since 2009 when Rio de Janeiro won the bid to host the 2016 Olympic Games, the Master Plan was revised in order to generate flexibility in the urban space and to carry out the multiple Olympic related projects through related executive orders (Gaffney, 2013). Therefore, the urban planning of Rio de Janeiro was orientated to meet mega-events' needs (Schwambach, 2012), and the Olympics have served as an excuse and became a tool to legitimize the transformation of Rio into a host city (Braathen et al., 2015). Vainer (2011) highlighted that in order to intervene for mega-event requirements they needed to generate decision-making frameworks to enable candidature and the implementation of projects. He stated that "this process has led to a 'city of exception', a new form of urban regime". He also mentioned that "in this type of urban regime the contract has become more important than the

law". The exceptional character (Agamben, 2005; Vainer, 2011; Freeman, 2012; Smith 2014; Aaron Richmond & Garmany, 2016) provides a political prospect in which the existing official spheres for decision-making are left aside, while the events become tools to legitimize for an authoritarian attitude of the governments (Braathen et al., 2015).

The vision of the Rio Olympics 2016

Rio 2016 vision was inspired and linked to the wider long-term planning strategy of the city. The vision was "the union of all Brazilians, performing the biggest event sport in the world and building proudly through sport, the national promise of progress".

In this regard, the Sustainability Management Plan (SMP) of the 2016 Olympics by the municipality of Rio de Janeiro was developed as follows. "The sport mega-events were planned from the beginning to give incentive to the realization of the long-term goals of Rio de Janeiro of improving the social, physical and environmental fabric of the city, and to establish new milestones for mega-events in South America" (Sustainability Management Plan, 2013).

5.3. Urban interventions to stage the Rio 2016 Olympics

5.3.1. Olympics' location choice

With respect to the Olympic intervention including the building of both sport and supporting infrastructures and also subsequent reuse of them, there is a specific case of urban change with two options: the revitalization of spaces already occupied and the creation of new urban territory (Munoz, 1997). To plan and organize Olympic Games, a city needs to evaluate existing sport infrastructures, related facilities and those that must be planned to meet the required standards, and their likely impacts on the city should be assessed.

The planning and selecting sites to build Olympic infrastructures return to the Plan for hosting the Pan American Games. Venues and proposals of the 2007 Games were considered as a baseline for the 2016 Games. In the 2007 Pan American Games, four areas throughout the city were selected namely Barra da Tijuca, Deodoro, Maracana and Sugarloaf (Pão de Açúcar) to develop sport facilities. Despite the official claims in the candidature about the equitable distribution of event-related development, in four aforementioned areas, in reality,

sport infrastructures were mainly concentrated in Barra da Tijuca which is known as a wealthy area (Mascarenhas, 2011; Sanchez & Broudehoux, 2013). This area is far away from city center and also from residential areas, in the north of the city, where most facilities were located, including the "Villa Pan" (Olympic housing). The Villa Pan was constructed on unstable subsoil with high costs (Gaffney, 2010) that was mainly funded from public resources. Indeed, the Athletes' Village for the 2007 Pan American Games was built on wetlands, generating major structural problems due unstable land conditions that required additional investment to save buildings. It led to unused and empty sites after the Games. According to Gaffney (2010), the urban development legacy of the 2007 Pan American Games remained ambiguous, since in the years after the event, all built facilities revealed problems that caused few competitions being hosted, no access to public use and maintenance problems (Curi et al., 2011).

Regarding Olympics development plan, there are similarities in terms of the site selections among the 2007 Pan American Games and the Olympics. In the candidacy process and preparation phase between 2009 and 2016, four areas were selected by the organizing committee. This plan modeled after the strategic planning approach pioneered in Barcelona (Leary & McCarthy 2013; Viehoff & Poynter, 2016). Consequently, in order to break Rio's long cycle of urban imbalance (Aaron Richmond & Garmany, 2016), four new urban centers namely, Barra da Tijuca, South (Zona Sul), Deodoro (North) and the historic center (West) neighborhoods with serious deficiencies were selected to develop Olympic-related infrastructures (Frigola, 2018).

The purpose of selecting the four Olympics areas was based on generating social and spatial balance in different areas of the urban fabric, and increasing the urban quality while making an equitable distribution of the event-related interventions' benefits (Bienenstein et al., 2012). The underlying concept was directly inspired by the Barcelona master plan for the 1992 Games (Silvestre, 2013).

5.3.2. Olympics-related land use planning

As mentioned in the previous section, the required sport infrastructures and related facilities were planned and built in four zones which are located in different parts of the city and all with different socio-economic characteristics. Each of the zones has received significant upgrades to make them suitable for Olympic demands. Among the targeted areas,

in the Barra and Deodoro areas extensive urban change has been triggered (Gold & Gold, 2016). Figure 5.1 shows land use map of the city of Rio de Janeiro in 2011 and location of the Olympic zones. Next section will describe the characteristics of the Olympic related-regeneration of the four zones.

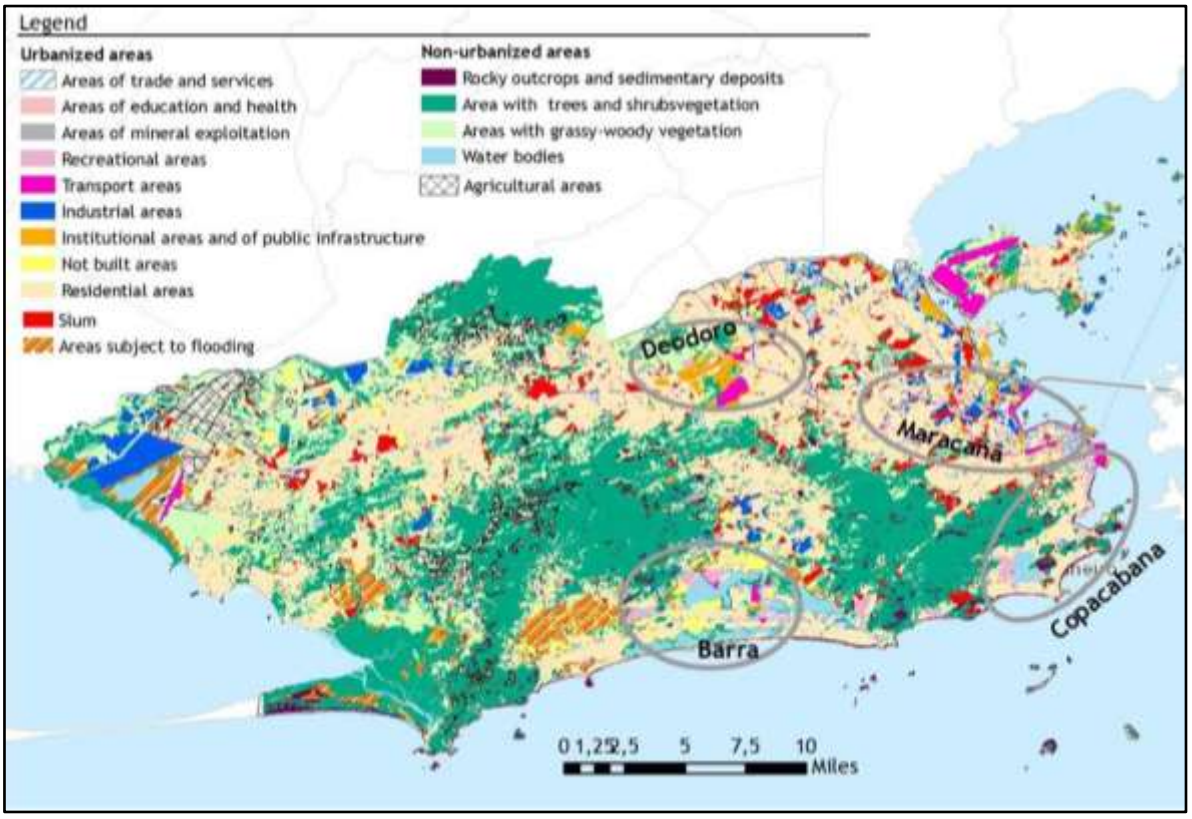


Figure 5.1: Land use map of Rio de Janeiro (2011) with the four Olympic zones

Source: IPP, 2013

Olympic park land use planning in the area of Barra da Tijuca

The main Olympic infrastructure is located in the northwest part of Barra da Tijuca region. This region is situated in the south part of Rio de Janeiro. The urban development process in this region accelerated after 1969 when its urban plan began to be implemented. The plan suffered many changes since its implementation in 1969. One of the most affecting changes was the densification of the land occupation, which was a result of the pressure of the real estate agents on the government administration. Therefore, the Barra da

Tijuca became a purpose of real estate agencies practices in order to achieve high profits standards (Silva, 2008).

In the current situation, Barra da Tijuca zone is mainly residential with middle class neighborhood in a valley surrounded by mountains which are mainly occupied by informal settlements. In forty years, it expanded as an elite suburb with more than 300,000 inhabitants (Sanchez & Broudehoux, 2013), a second urban center for Rio. Land-use of the area has developed as mono functional zoning and its traffic structures are bold (Martin, 2014). Figure 5.2 illustrates the Olympic project in Barra da Tijuca zone before construction.

Most Olympic activities took place in the Barra coastal area with 14 Olympics venues and featuring the Olympic Park, Olympic Village, Media Village, International Broadcast Center and Golf Course. Figure 5.3 shows the Barra Master Plan for 2016 Olympics.

Figure 5.2: Aerial image of Olympic project development in Barra da Tijuca zone

Source: The Guardian. Retrieved from: https://www.theguardian.com/sport/2015/aug/04/rio-olympic-games-2016-property-developer-carlos-carvalho-barra

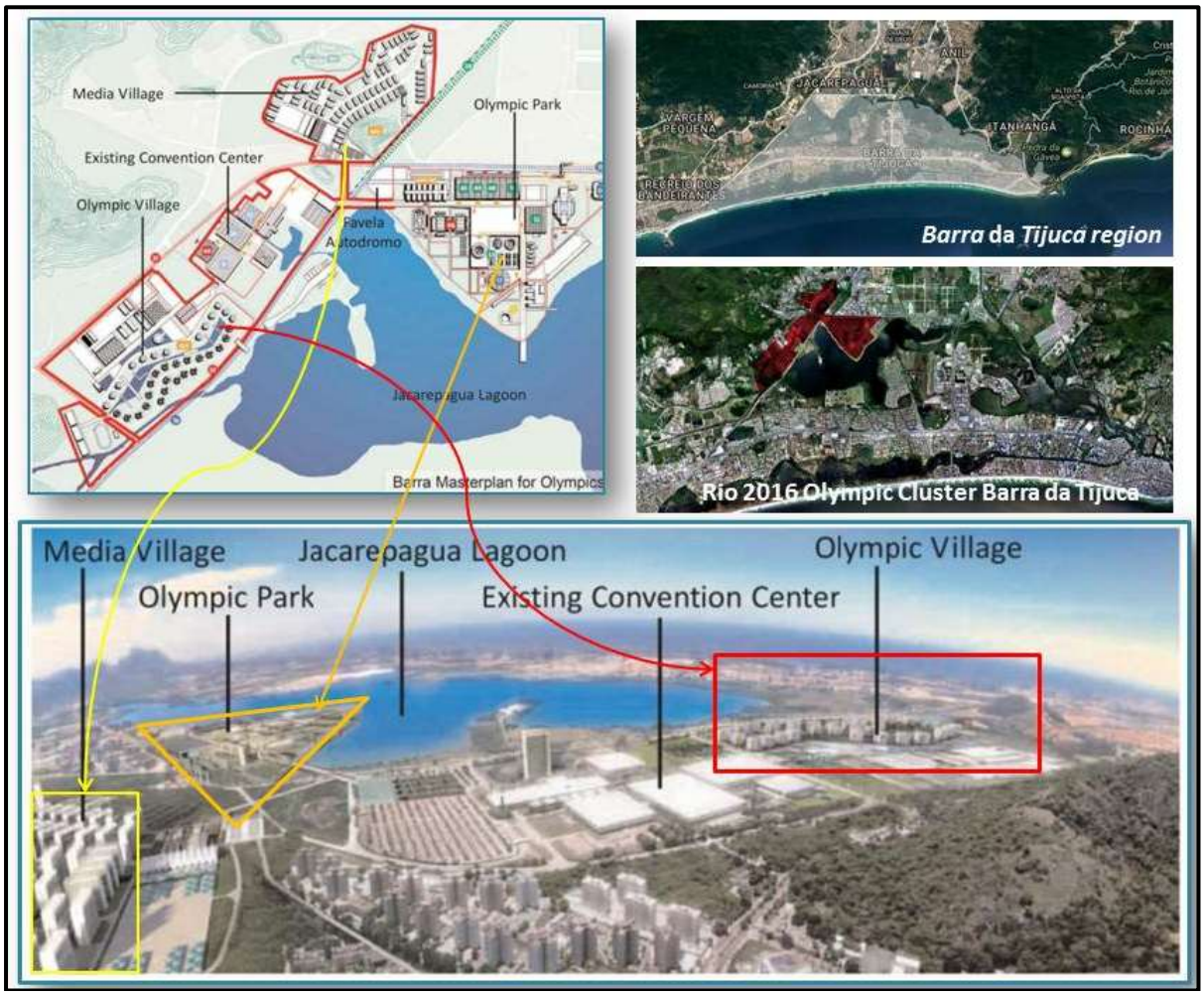


Figure 5.3: Aerial view of Barra Master Plan Olympics 2016

Source: https://www.e.architect.co.uk.Information provided to website by BCMF Arquitetos

The Olympic Park was built through a Public-Private Partnership (PPP) between the City Government and the Rio Mais Consortium. It was the heart of the Games with an area of 1,180,000 square meters. The development of the park was planned according to the following three phases: 1st) for hosting the Olympic Games; 2nd) for a transition period to last about seven years (starting in 2018) which was planned for immediate post-event period; 3rd) for target year 2030 when it is intended to showcase the 2016 Olympic legacy (Sheridan, 2014; Sanchez & Essex, 2017). Figure 5.4 shows an aerial image of all Olympic-related infrastructures in Barra da Tijuca zone after construction.

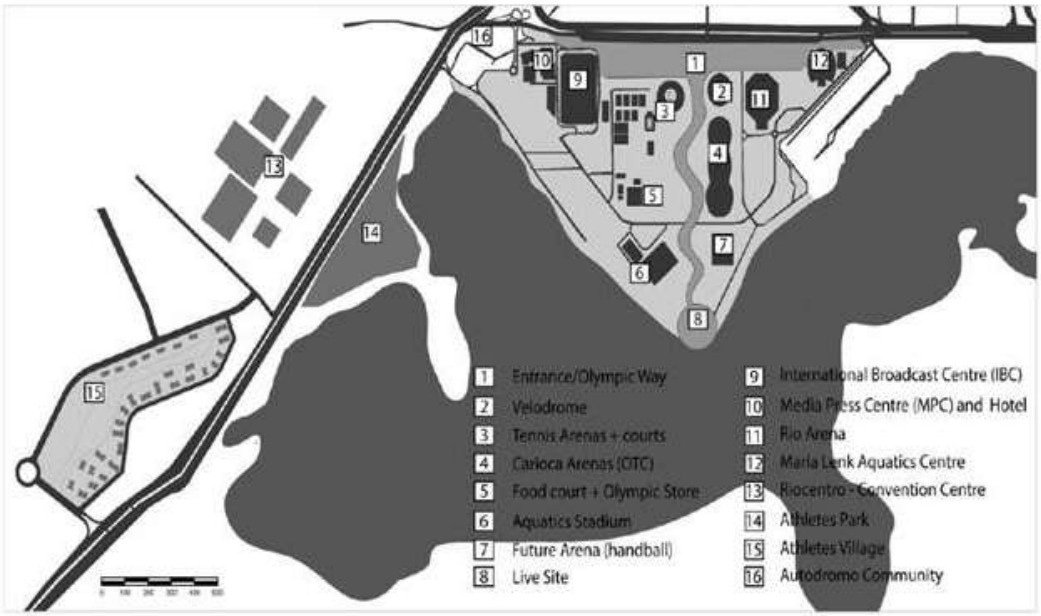
Figure 5.4: Aerial image of Barra da Tijuca Olympic zone

Source: The Washington Post, 2016, Lu, D., Rivero,C., & Karklis, L.

https://www.washingtonpost.com/graphics/sports/olympics/rio-olympic-venues-from-above/

Accessed 23 February 2018.

The Olympic Park Master Plan included public spaces, accessibility, public transportation infrastructure, separate access for athletes and public, environmental conservation, feasibility and unique access for parking. Two types of venues were planned in the Olympic Park: five permanent and four temporary venues. Figure 5.5 shows the master plan of Olympic Park in Barra da Tijuca zone. According to the development plan, temporary structures were planned to be completely dismantled and partially used elsewhere. For this reason, special attention was given to re-usability of temporary venues in other cities of Brazil (Hladik, 2016). Figure 5.6 shows the aerial view of Olympic Park before and after construction.



Master plan including: Athletes Village, Athletes' Park and Convention Centre in Olympic Games period. The Aquatics Stadium (6) and the Handball Arena (7) were changed to benefit future real estate developments
Source: Sanchez & Essex, 2017

Master Plan of the Olympic Park for Games phase 2016
Source: Rio de Janeiro City Council, 2013

Figure 5.5: Master Plan of the Olympic Park for Games phase 2016

Olympic park before construction

Source: http://www.abc.net.au/news/2014-04-15/an-aerial-view-of-olympic-park-in-rio-de-janeiro-taken-in-novem/5390418

Olympic park after construction

Source: https://builtworlds.com/news/summer-olympics-is-rio-ready/

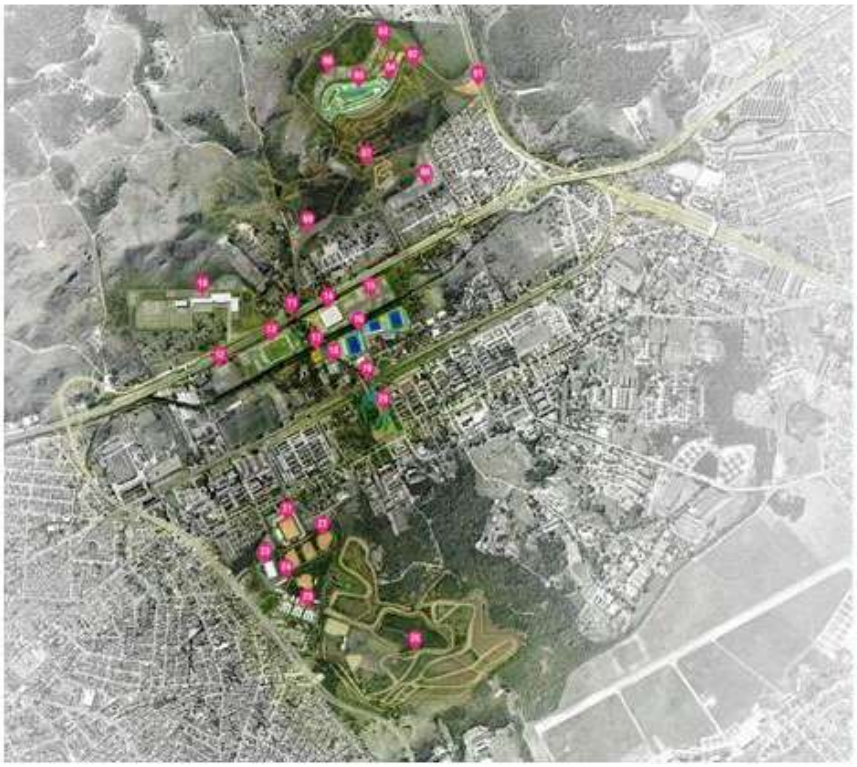
Figure 5.6: Aerial view of Olympic Park before and after construction

Olympic Park land use planning in the Deodoro area

Deodoro was one of four venue development locations for the 2016 Olympics. It was the second largest Olympic Park of Rio 2016 Games with an area of 2 million square meters. The area of Deodoro is situated in the western region of Rio de Janeiro, about 30 km north of Barra Park, far from the city center and with low density and low level accessibility (Schwambach, 2012). This area suffered from insufficient urban infrastructures along with a poor transportation system to support the needs of local residents. According to Vigliecca and Associados Brazilian firm, this area in particular has the largest amount of young people and one of the lowest Human Development Indexes (HDI) in the city (Howarth, 2016). Deodoro is surrounded by some violent neighborhoods (Schwambach, 2012) and so, it was not a first choice due to the necessity of investments to improve the neighborhoods and, especially due to lack of public transport facilities. But, Deodoro is also a military area having specific sport infrastructures required for the Olympic Games. Moreover, Deodoro Sports Complex already had about 60% of the permanent facilities completed, and it had hosted the 2007 Pan American Games (Neto et al., 2018). Therefore, the existing sport facilities were the reason for the choice of this area. Some facilities such as the National Shooting Centre, the pool used in the modern pentathlon, the National Equestrian Centre and the Hockey Centre needed to be renovated. However, three facilities, so-called the Deodoro Arena, Olympic BMX Centre and the Olympic Canoeing Stadium were built for permanent uses while two other facilities were temporary.

In addition, other Olympic-based activities took place in this area, namely the construction of the BRT transportation to improve the transport network with the renovation of the regional train stations. Paving and dredging of rivers and channels were committed by local authorities.

After the Olympics, the City Council had planned to convert the Deodoro Complex into the second largest public leisure area in the city, known as X-Park. According to city authorities, this area was targeted to generate recreational areas for the local residents, in the post-event period. Figure 5.7 presents the Olympics facilities in Deodoro zone.



Site plan of Deodoro zone sport facilities,2016
Source: https://www.archdaily.com/792725/deodoro-olympic-park-rio-2016-vigliecca-and-associados

X-Park at Deodoro, Olympic Park before construction in 2015
Source: Associated Press

X-Park at Deodoro, Olympic Park after finishing in 2016
Source: Associated Press

Figure 5.7: Olympic facilities in Deodoro zone

Olympic Park land use planning in the Copacabana area

Copacabana area is located on Southwest of Rio close to its main port. This area is rapidly growing and it is a relatively high-density development area, which did not need large-scale improvements and interventions. It is also a wealthy area, known as the best area in terms of urban infrastructures, such as drainage, sewage, gas, subway and other urban facilities (*e.g.* restaurants and hotels) (Schwambach, 2012). Olympic-related infrastructures in Copacabana area were mainly considered to be temporary. The Olympic plans considered remediation and protection of waterways of the zone. Four required venues in Copacabana zone were temporarily built along the coastline. All the beach sports, rowing, sailing, canoeing, kayaking, and beach volleyball took place in the Copacabana cluster. Copacabana beach volleyball was a temporary arena that was dismantled after the Games. Next to this area is the Lagoon Rodrigo de Freitas which was planned for hosting the rowing and canoeing competitions (Figure 5.8).

Figure 5.8: Location of Copacabana Olympic zone

Land use planning in the Maracana area

Maracanã stadium situated about 5 km west of the city center area (Figure 5.9) was originally built for the 1950 FIFA World Cup, later being used for the 1997 Pan American Games and the 2014 FIFA World Cup. Since the stadium was in need of repair, it underwent

extensive renovations in 2013. It hosted the opening and the closing ceremonies of the Olympics as well as decisive Games for the football tournament.

The stadium is served by the main transport systems such as the subway and suburban railway lines, which provide easy access to other areas of the city (Florez et al., 2014). Nearby in the surroundings of the Maracanã stadium, there are three subway stations and three commuter railway stations.

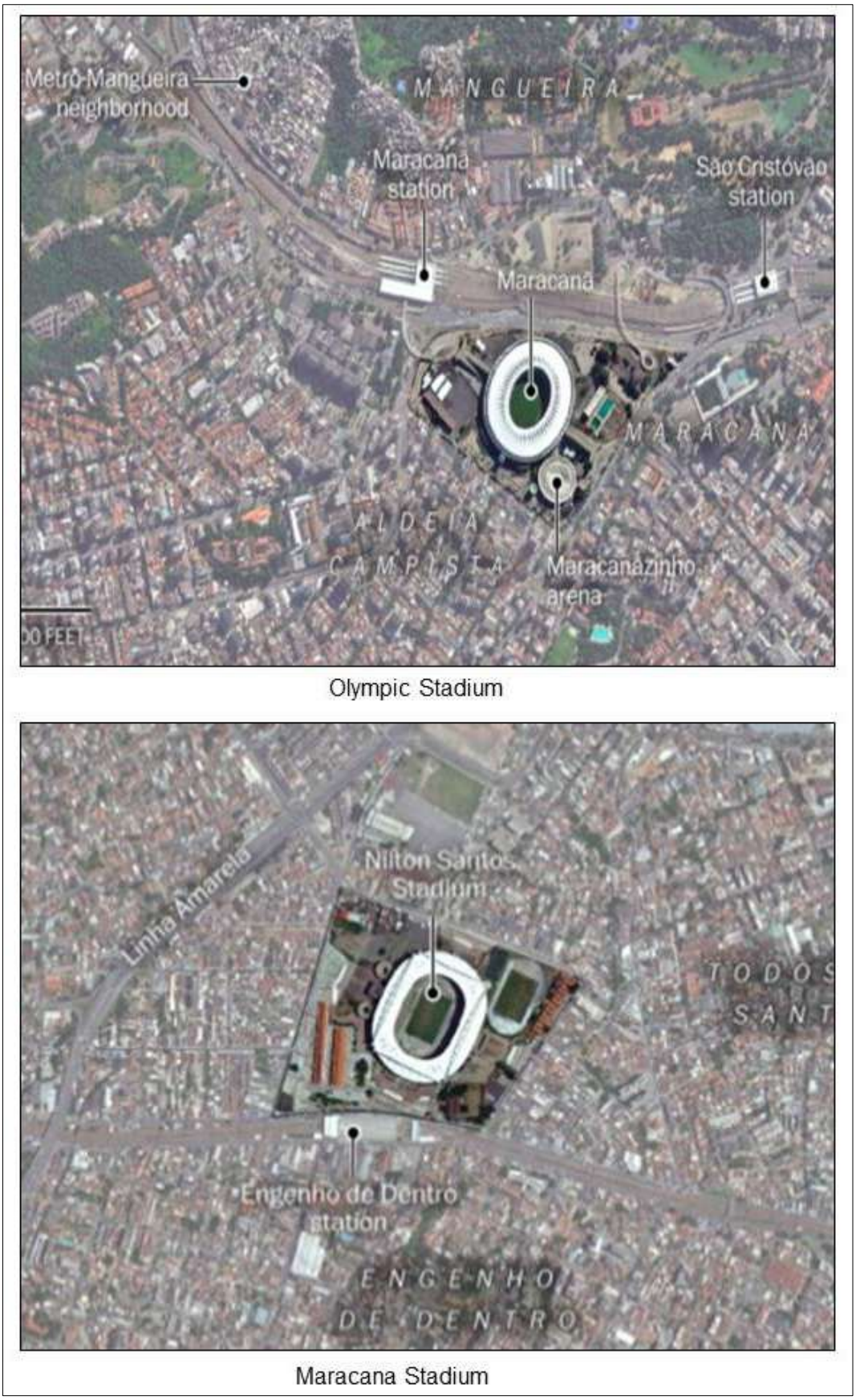


Figure 5.9: Aerial image of Maracana Stadium and Olympic Stadium

Source: The Washington Post, 2016

Porto Maravilha as an Olympic project

The Porto Maravilha Olympic project is an exceptional and large-scale urban waterfront regeneration project. This old port with a total of 5 million square meters is located in the north of the central business district of Rio (Ribeiro & Santos Junior, 2017). The port area was occupied by empty warehouses, industrial buildings and also mostly low-income families and working-class residents, 51% of whom were tenants in 2002 (Galiza, 2011). It is surrounded by one of Rio's historic favelas, the Morro da Providência.

The main purpose of the Porto Maravilha revitalization which started in 2011 was to integrate this region with the rest of the city. It also aimed to create a new centrality in Rio de Janeiro, bringing a new economic role to the area (Schwambach, 2012). The goal was to transform degraded spaces and convert the old port area into a world-class mixed-use living and working area (Sanchez & Broudehoux, 2013), with up-to-date tourist facilities and cultural amenities that will act as Rio's new international face (Nu, 2012). This port revitalization project was massive in scope, affecting five inner-city districts (Sanchez & Broudehoux, 2013) and it represented a large an innovative financial model by the Public-Private Partnership to contribute to the implementation of the project. The Master Plan for Porto Maravilha includes rezoning for housing and commercial mixed uses. It will become the new central business district of Rio de Janeiro. These regenerations were developed within the framework of the preparation of the Olympics through favela improvement programs and promotion of popular entrepreneurship (Ribeiro & Santos Junior, 2017) (Figure 5.10).

Figure 5.10: Aerial image of Porto Marvilha project showing areas of land-uses in new development

Source: Amsler, 2011, http://portomaravilha.com.br/conteudo/estudos/ea1.pdf/ accessed 5 April 2018

Post-event planning for Olympics Park

The important step in suataible sport mega-event planning and management process is the planning for post-event period. According to the 2016 Olympics organizers, there were no new structures being built without the end use in mind (Roddar, 2014). The Rio stadia and other Olympic-related planning were expected to create a benchmark for sustainable urban development. The post-event phase planning is emphasized on the social, economic and environmental sustainability of the area.

According to the Master Plan, the Olympic Park would transform from Olympic Games mode to legacy mode with a specific focus on ecological restoration (Kassens-Noor, 2012) based on the creation of public spaces and security areas (del Rio, 2012; Dezeen, 2013). A Master Plan (alignment plan) was prepared for post-event adaptation of the Olympic park. Figure 5.11 shows AECOM proposed Master Plan of the Olympic Park for the post-event phase, in target year 2030.

Figure 5.11: AECOM Master Plan of the Olympic Park for the post-event phase
It shows a dense and mostly perimeter-block urban design
Source: Rio de Janeiro City Council, 2013

This plan was modified with the design of bigger blocks and more straight lines than in the original proposal and was approved in 2012 (Sanchez, 2016). Based on the Master Plan Rio's Olympic Park development will continue for more than 15 years after the end of the Games. In 2030, about 70% of the land of the Olympic Park will be transformed into a new neighborhood with commercial areas, office buildings and hotels. The remaining 30% will be converted into sports venues such as an Olympic Training Centre run by the Brazilian Olympic Committee for the use of elite athletes (Gold & Gold, 2016; Sanchez, 2016). Figure 5.12 shows the approved plan of the Olympic Park for post-event phase, in target year 2030.

The Master Plan for the post-event stage considered two phases: i) the transition phase, to begin after two years of the Games closure, will focus on the transformation of the site into green park land and temporary functions such as tree nurseries, open air cinemas, green houses, and other examples of light structures; ii) the legacy phase which will start twelve years later when the sport venues are reused. In this phase, the master plan for the site will include new residential and commercial buildings and leisure activity venues (Soveral, 2012)

aiming at "a global center of sporting excellence for future generations" (Born to Engineer, 2016).

In this way, the Master Plan puts emphasis on the commercial, residential and recreational developments in post-event phase. According to the Government, some of the temporary spaces and permanent facilities are going to be transformed to perform other functions after the Olympics. For example, the arena will be coverted in the future into four public schools; the commercial center with an area of 800,000 m2 will be repurposed for different residential buildings; some facilities such as the new velodrome, professional tennis court, seven training tennis courts, Media Center and International Broadcast Centre; accommodation buildings in Olympic Village site will include 31 residential buildings, divided into seven condominiums and 3604 apartments; finally, a Golf Course that will serve as a legacy for the city. Planning for post-event period provides a long-term development for Barra da Tijuca area. Based on the post-event scenario, the access of this region to the city center and to the airport, are significantly improved through the development of subway lines, highways and new BRT corridors (Gold & Gold, 2016).

Figure 5.12: The approved plan for the Olympic Park for post-event phase, in year 2030

Source: Rio de Janeiro City Council, 2013

5.4. Transportation improvements related to Rio Olympics

There is a strong relationship between the appropriate location of sport mega-events' infrastructure development and the acceleration of urban spaces transformation. Normally, a developed country host city has long-term transportation plans to solve its problems, before bidding for an Olympic Games (Richter, 2012). In so being, it will be possible to provide efficient and timely transportation - a major IOC concern - for the athletes and officials to the Olympic zones and stadia without major city council concerns. Figure 5.13 depicts a conceptual model of location of Olympic elements and their relationship with city and transport system. The figure shows the situation of Olympic areas and their connection through transportation network with each other and to city center which usually provides for tourist accommodation and entertainment facilities. Olympic Village and Media Village need to be located adjacent to the main Olympic Park for their close connection. The transportation system should also provide rapid and efficient connection between the main Olympic Park and the airport.

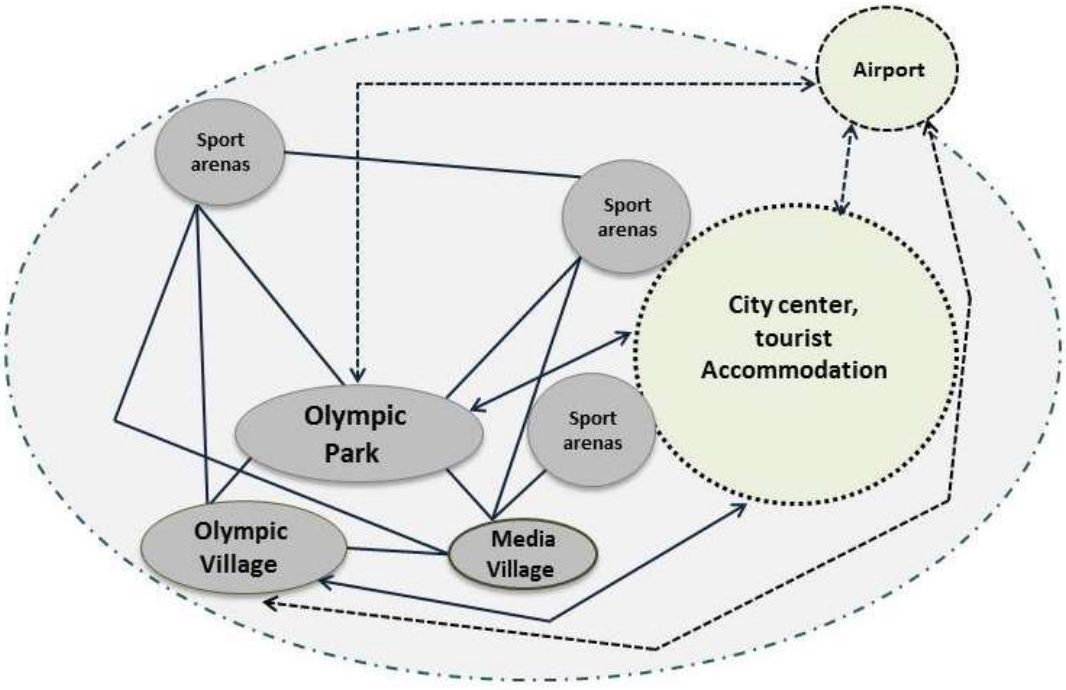


Figure 5.13: Conceptual model of relationship between Olympic elements with city and transport system

The transportation system in Rio de Janeiro is mainly based on the road system. The public transportation in the city is running essentially through buses. The subway is not very developed, but there are five train lines connecting the north to the west zones, basically the poorer areas, to the city center (The OGI-SAGE/COPPE/UFRJ Research Team, 2014). Figure 5.14 illustrates the public transport network in for the 2016 Olympics.

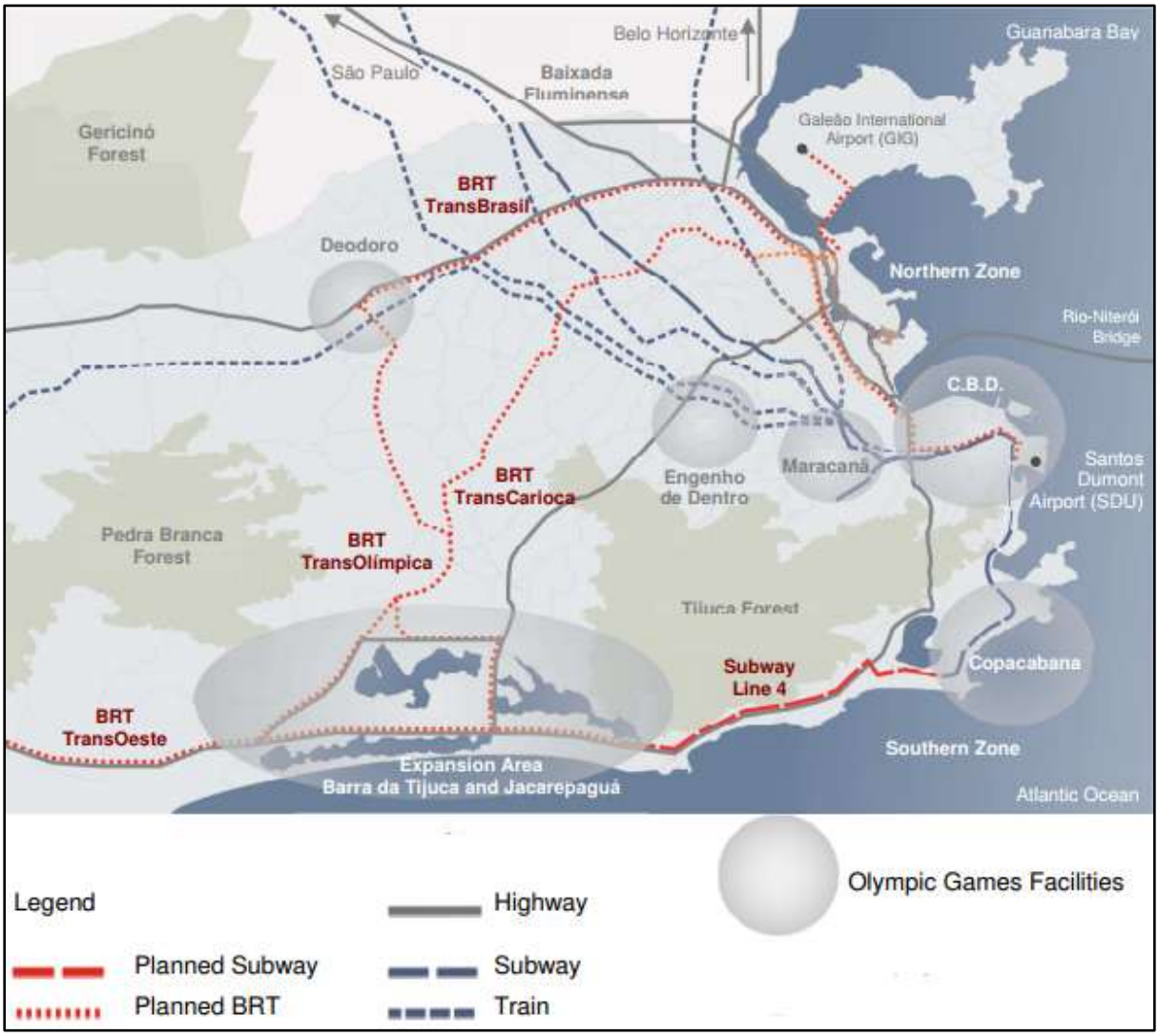


Figure 5.14: Map of public transport network intervention for Rio 2016

Sources: Simas & Bodmer (2013)

Transportation improvement projects of Rio included public transportation and road systems for easy and less congested traffic. A third subway line to provide access into the Olympic site and three new Bus Rapid Transit (BRT) lines were implemented in the city to modernize and connect the planned areas. One of the event-related transportation projects was the construction of 150 km of new BRT systems, to connect Barra da Tijuca to the city center. In addition, subway lines have been extended to improve the link of Barra region, where the main Olympic facilities were located, with the city center (Horne and Whannel, 2016) through elite neighborhoods in the South of Rio. These lines were planned to improve the connections between the more northern deprived areas with the western area and the city center. However, access to public transport by a number of areas, particularly low-income neighborhoods, is remained weak. Extension in the transportation network was encouraged by public policies by the end of 2012. Table 5.1 shows transport network extension to meet 2016 Olympic needs.

Overall, 215 km of new public transport had been developed, and subway and suburban rail (the current subway only 42 km) had also been added. On the other hand, public transportation network of the city was linked to the cycling network (Figure 5.15).

Table 5.1: Olympic-related transport network development, 2012

Modal	Extension (km)
Road-Bus Rapid Transport (BRT)	56
Road- Bus Rapid System (BRS)	29
Ferry boat	4128
Subway line 4	46.2
Train	270
Cable car	3.5
Bikeways	300

Source: The OGI-SAGE/COPPE/UFRJ Research Team, 2014

Figure 5.15:Cycle lanes in city of Rio de Janeiro

Source: (The OGI-SAGE/COPPE/UFRJ Research Team, 2014)

5.5. Olympics-related environmental remediation plans

In 1996, environmental protection was added to the Olympic Charters and through Local Agenda 21, environmental factors were incorporated into planning, as well as a relevant organization and legacy concern of the hosts. The environmental commitments were emphasized by Rio 2016 candidature file dating back to 2009. Accordingly, "the 2016 Games will accelerate several important environmental projects bringing direct benefits to local communities including regeneration of urban areas, air quality improvement and reduced consumption of non-renewable natural resources" (Rio 2016, 2009). Brazilian Olympic officials outlined in their bid, an ambitious plan to make the Games environmentally sustainable (Trendafilova et al., 2017). Rio promised a "Green Game for a Blue Planet". Table 5.2 shows the strategic objectives of Olympic-related environmental footprint reduction.

Table 5.2: The strategic objectives of Olympic-related environmental footprint reduction

Themes	**Specific objectives**
Environmental Conservation and Clean-up	Minimizing the impact on the existing ecosystems at the Olympic and Paralympic facilities and their immediate surroundings
	Promotion the environmental clean-up of bodies of water in the regions of the Games
	Strengthen and accelerate environmental protection, conservation, restoration and rehabilitation programs
	Expansion monitoring of air and water quality in the Games regions
Waste Management	Decommission and commence environmental clean-up of landfills and implementation integrated solid waste treatment
	Alignment and implementation management plans for all construction waste, ensuring appropriate management and final treatment
	Management and responsible treatment of the solid waste operations of the Games
	Management and responsible treatment of corporate solid waste

Source: Rio 2016, 2013

5.6. Event-related organizations and urban management

It is common for the new infrastructure to serve primarily the needs of the Games and not the city's development. However, it depends on how city managers and planners take advantage of this opportunity for urban development. Mega-events involving huge urban development projects to accommodate the Games can be considered as an urban governance instrument (Qu, & Spaans, 2009).

Structures of sport mega-events management in Brazil included the following sectors (Global Trade, 2012): Special Olympics Secretariat in Rio de Janeiro that was responsible for managing part of the venues and infrastructure projects; Municipal Olympic Company that was created for coordinating the municipal projects and activities related to the 2014 FIFA World Cup and the 2016 Olympics; Investment Promotion Agency that was responsible for investments on projects; City Hall that conducted a large Port Area regeneration project, which included the building of museums, an aquarium, and other projects already under development; and, many projects funded through the Public-Private Partnerships of Brazil's Growth Acceleration Program (PAC).

According to Levy (2012), other active organizations were also involved in 2016 Games, as follows:

- The 2016 Rio Organizing Olympic Committee, which was connected institutionally to the IOC. It was responsible for planning and issuing the main tenders and delivery of services inside sports venues;
- The Brazilian Olympic Committee, a non-profit, private company also connected to the IOC, which was responsible for supporting the Brazilian athletes and teams;
- The Brazilian Soccer Federation, which worked with FIFA in preparation for the 2014 World Cup;
- Industry Associations such as the Construction Association (SINDUSCON Rio), the state of Rio Federation of Industries (FIRJAN), among others.

5.7. Costs of Rio Olympics

The 2016 Olympic Games was a stimulus to larger urban changes in the Rio de Janeiro's recent history. Rose and Spiegel (2011) have noted that the right to host the 2016 Olympic Games came with a $15 billion bid, a sum equal to over $ 2,000 for each citizen of Rio. A considerable amount of this money was scheduled to improve the urban transportation system. Transportation infrastructure amounted to 57 % (Legroux, 2014) of the total investments. Table 5.3 shows Olympic-related transportation projects and investments in which the budget for line 4 of the subway dominates the costs.

Table 5.3: Olympic-related transportation projects in Rio de Janeiro

Projects	Description	Total Cost (U$ Billion)
BRT	BRT Transoeste	0.35
	BRT Transcarioca	0.55
	BRT Transolimpica	0.73
Subway Trains	BRT TransBrasil	0.48
	Line 4 construction (South area- Barra da Tijuca)	3.11
Light Rail System		0.50
Total		5.72

Sources: Pereira, 2018

Rio 2016 Olympics was estimated at over passing the total bid amount of US$15 billion (Clift & Manley, 2016). In fact, the initial budget of R$33 billion (US$ 16.5 billion in 2010) undoubtedly rose since October of 2009 (Gaffney, 2013). While the country was facing political chaos and a financial crisis, Rio state and the city faced difficult challenges to finish preparations for the Olympics (McBride, 2018). In June of 2016, the Brazilian Federal Government temporarily supported Rio's budget by injecting approximately $900 million dollars (Kiernan & Jelmayer, 2016). This money only prevented a massive chaos during the Olympic Games (McBride, 2018). According to Nolen (2016) "public employees had already gone weeks without pay, basic public services had been neglected, and the city was in risk of defaulting on its debt service". Trendafilova et al. (2017) stated that "during this economic downturn and fiscal crisis, the focus on environmental sustainability and cleaning the waterways lost support, especially from a financial standpoint". Table 5.4 shows projects, responsibilities and estimated costs in the four Olympic zones.

Table 5.4: Projects, responsibilities and estimated costs in Rio´s Olympic zones

Olympic zone	Number of projects	Types of project	Resources and execution	Estimated costs
Barra	25	Olympic Park; Tennis center; Velodrome; Handball Arena, Aquatic center International Broadcasting Center; Main Media Center; Media Hotel; Athletes Village; Golf Course	Federal Government and City Government City Government and Private Sector	R$ 5,537.9m
Deodoro	15	Seno Slalom Stadium; BMX Center; Fencing Arena; Field Hockey Center; Mountain Bike; Pentathlon; Rugby; Equestrian; Sport Shooting Center	Federal government and city government	R$835.8m
Maracana	8	Rowing Stadium; adaptation of marina	Federal, state and city	R$45.0m
Copacabana	4	Adaptation of; Sambadromo, Olympic Stadium and Maracanazinho Arena	Federal, state, city and private	R$93.0m
Total	52			R$6,511.7m

Sources: Adapted from: www.brasil2016.gov.br/en/news/olympic-public-authority-apo-publishes-update-responsiblities-matrix (lasted accessed 28 July 2015)

5.8. Synthesis

This chapter reviewed the event-related urban planning background in Rio de Janeiro. It presented the importance of how the city generated a vision to increase its competitiveness to host the games. It also highlighted how governance regime was shaped and changed by close cooperation between the municipality and private sector, which led the city towards urban entrepreneurship. This chapter also presented all Olympics-related actions including the construction of sport infrastructures, transportation improvements and environment remediation activities, based on development plans for the Olympic areas in the city. Therefore, it described a series of event-related urban interventions, in the framework of planning to host the Games in Rio de Janeiro. Their implementation caused changes in land uses and even in the landscape of urban areas. The last points addressed the various event managers and organizers that were involved in the Olympic Games, as well as the mega event costs.

The next chapter will present the research on the impact intensity of 2016 Olympic Games through experts' views survey.

Chapter 6 : Experts' Opinions about of Sustainability Sport Mega-events Impacts in Rio de Janeiro

6.1. Introduction

This chapter aims to explore the sport mega-events' sustainability impacts in Rio de Janeiro based on the physical, environmental, economic and social-cultural dimensions. Rio is a megacity that has recently experienced sport mega-events namely 2014 FIFA World Cup and 2016 Olympic Games. In order to better understand their impacts in this city, it is essential to know the opinion of experts related to this issue. The perspectives of the experts were investigated about impact intensity, in all selected dimensions. The knowledge of experts may help to improve the planning and management practice by urban planners and local authorities in order to enhance the main advantages from hosting sport mega-events. To my knowledge, no prior survey has assessed experts' viewpoints on these types of events.

The chapter begins by showing the analysis of collected data from the experts' survey. Then, a boxplots analysis presents the outcomes of sustainability impact intensity of Olympics based on experts' views.

6.2. The survey

To assess, in detail, the intensity of Olympics' impacts on Rio de Janeiro, questionnaires (close-ended questions) were developed from an in-depth review of the literature and a survey was conducted to Brazilian experts. Participants were asked to rate each of the themes based on a 5 point Likert scale ranging from very strong (1) to very weak (0.2). Afterwards, the collected data from 18 experts' opinion survey is analyzed by One-Sample Wilcoxon Signed Rank Statistical Test and, then. through boxplots. The questionnaire in both English and Portuguese languages is presented in the Appendix. Next section describes the results of Olympics impact intensity for all four dimensions.

6.2.1. Ranking of indicators' impact intensity

Seventeen indicators of sport mega-events' impacts in physical, economic and social-cultural dimensions and twelve indicators in environmental dimension were surveyed. Sum of Intensity, Rank, Mean and Standard Deviation were computed for all indicators. Tables 6.1 to 6.4 present the ranking of indicators according to the sum of impact intensity based on the experts' opinion. The top Rank indicators are highlighted whether positive or negative. This

ranking portrays the views of Brazilian experts as they converge to the intensity of the impacts felt in Rio de Janeiro.

According to the analysis of the ranking impact (table 6.1), in the physical dimension, growth in public transport, airport traffic and urban and physical damage, due to the lack or weakness of planning and control, show the highest negative impacts, respectively.

The environmental dimension (table 6.2) displays the highest negative impact of high consumption of water, energy and non-recyclable waste.

The highest negative economic impact is related to the increase on the prices of goods and services (table 6.3).

Unlike other dimensions, in the social-cultural dimension (table 6.4), the highest Rank is positive which evidences the importance experts give to the increase in international reputation and exposure of Rio.

Table 6.1: The ranking of impact intensity of the physical indicators

Number	Indicators	Sum of impact intensity	Rank	Signed rank	Mean	Standard deviation
1	Increase of regeneration and redevelopment	10	5	-5	0.56	0.16
2	Increase the opportunity for regeneration of deprived and abandoned districts	9	1	-1	0.52	0.21
3	Providing an incentive for the restoration of historical places	10	6	-6	0.56	0.18
4	Increase the built heritage protection actions	10	6	-6	0.52	0.17
5	Development of tourism capability in hotel industry	9	1	-1	0.73	0.23
6	Improving urban public and green space quality	12	15	15	0.59	0.22
7	Improvement of public facilities	10	8	-8	0.60	0.20
8	Stimulus to improve transportation	10	9	-9	0.67	0.21
9	Increase in integration of urban transport system	11	11	11	0.61	0.19
10	Upgrading road and rail networks and airport infrastructure	10	10	10	0.53	0.24
11	Insufficiency of physical facilities such as parking spaces	9	4	-4	0.81	0.18
12	Growth in public transport and airport traffic	14	17	17	0.69	0.21
13	Stadia built can provide landmark	12	12	12	0.52	0.27
14	Improvement of infrastructure in surroundings of the Olympic area	9	1	-1	0.71	0.20
15	Urban areas degradation due to non-use of the new sports infrastructure in post-game	12	13	13	0.76	0.17
16	Heavy construction of public facilities that are not essential or too luxurious	12	14	14	0.81	0.18
17	Urban and physical damage due to the lack of or weakness of planning and control	14	16	16	0.75	0.19

Source: own work, 2018

Table 6.2: The ranking of impact intensity of the environmental indicators

Number	Indicators	Sum of impact intensity	Rank	Signed rank	Mean	Standard deviation
1	Developing green transport	6	2	-2	0.36	0.19
2	Opportunity to improve air and water quality, waste disposal and clean energy development	6	4	-4	0.38	0.19
3	Developing greener environment	6	2	-2	0.36	0.19
4	Increase the awareness with natural environment	7	5	-5	0.42	0.19
5	Creation of new principles of environmental protection and renewable energy sources	6	1	-1	0.38	0.16
6	Increase traffic congestions	13	11	11	0.78	0.21
7	Increase air pollution due to public transport and air traffic	12	6	-6	0.71	0.24
8	Increase noise pollution	12	8	8	0.73	0.24
9	High consumption of water, energy and non-recyclable waste	14	12	12	0.82	0.16
10	Increase in CO2 and greenhouse gases emissions due to major influx of visitors	13	9	9	0.75	0.19
11	Pollution caused by demolishing temporary Olympic Game structures	12	7	7	0.72	0.21
12	Environmental damage due to absence of applying to evaluate and monitoring of environmental impacts of programs, plans and policies	13	10	10	0.75	0.18

Source: own work, 2018

Table 6.3: The ranking of impact intensity of the economic indicators

Number	Indicators	Sum of impact intensity	Rank	Signed rank	Mean	Standard deviation
1	Promotion of city's economy	11	5	-5	0.61	0.20
2	Providing host city residents with long term employment opportunities	8	1	-1	0.46	0.21
3	Wealth generation	11	4	-4	0.60	0.19
4	Increase opportunities of relevant business	12	7	-7	0.66	0.19
5	Increase of small businesses	11	3	-3	0.59	0.19
6	Attraction of more investment in infrastructure and new facilities	13	10	10	0.74	0.21
7	Increase country's openness and liberalization trade	10	2	-2	0.56	0.18
8	Visitor expenditures boosting trade	13	8	-8	0.76	0.13
9	Growth in tourism in the long-term	11	6	-6	0.62	0.19
10	Improper use of funds and misappropriation of public investments	16	14	14	0.71	0.22
11	Elimination or postponement of investment health and education	14	11	11	0.92	0.12
12	Spending money in lavish sports facilities that have little use after the Games	16	15	15	0.81	0.25
13	Avoidance by non-sport tourists to travel in the Games	15	12	12	0.62	0.24

	period					
14	Growth of security costs	15	12	12	0.88	0.17
15	Increase the property and real estate prices in the surroundings of Olympic area	17	16	16	0.68	0.21
16	Increase of tax rates for host city residents	13	8	-8	0.84	0.15
17	Increase on the prices of goods and services	17	17	17	0.94	0.11

Source: own work, 2018

Table 6.4: The ranking of impact intensity of social-cultural indicators

Number	Indicators	Sum of impact intensity	Rank	Signed rank	Mean	Standard deviation
1	The volunteering program impacts on people's education and income	10	7	-7	0.53	0.19
2	Increased involvement of residents because of more possibility to use sport facilities	9	4	-4	0.49	0.18
3	Promoting public health	7	2	-2	0.37	0.17
4	Increase community confidence and awareness	9	5	-5	0.49	0.23
5	Increase excitement and bringing the community together and closer	12	9	-9	0.67	0.23
6	Increase social welfare from investments in public facilities and infrastructure	9	6	-6	0.55	0.22
7	Increase in providing the event-related social activities	12	10	10	0.69	0.24
8	Increase the chance to meet new people and cultural exchange	14	16	16	0.79	0.22
9	Reduce serious crime and anti-social behavior rates as a result of investments in security	8	3	-3	0.42	0.17
10	Put the city on the map, increase international reputation and exposure	15	17	17	0.84	0.18
11	Pride boost due to improved city's image worldwide	13	11	11	0.71	0.23
12	Increase in multi-cultural destination promotion	14	14	14	0.76	0.27
13	Decrease poverty	6	1	-1	0.31	0.17
14	Decrease and disruption of residents' quality of life during the games	10	8	-8	0.58	0.26
15	Push away poor people who live in Olympic area due to new development	13	12	12	0.72	0.30
16	Disruption in the social fabric due to gentrification	13	13	13	0.73	0.25
17	Increase distrust between authorities and citizens due to lack of transparency	14	15	15	0.78	0.28

Source: own work, 2018

The combined results for the experts' assessment of the impacts on Rio are presented in table 6.5. According to the null hypothesis, H_0, if $W < 47$ for physical, environmental and economic and social-cultural domains, it was rejected the null hypothesis. Each computed value of W in all dimensions is smaller than 47. Therefore, this result reveals that hosting

sport mega-events in Rio generate unsustainable conditions in physical, environmental, economic and social-cultural aspects according to the experts' opinion.

Table 6.5: Synthesis of results of the statistical analyses through the application of Wilcoxon Signed Rank Statistics

		Dimensions of impacts			
		Physical	Environmental	Economic	Social-cultural
Statistics	Median	10.2	12.1	13.0	12.0
Wilcoxon Signed Rank Test (Sum)	Positive (W+)	108.0	57.0	108.0	108.
	Negative (W-)	41.0	20.0	44.0	45.0
	W (smallest rank)	41.0	20.0	44.0	45.0

Source: own work, 2018

The environmental dimension is the one that stands further away from an overall positive impact and the socio-cultural dimension is the one closer to the critical value as is shown in table 6.5.

6.2.2. Identification of main impacts

To identify which factors in every dimension were perceived as having the strongest positive or negative impacts on Rio, they were examined in detail. The use of Boxplots allows rapid visual analysis of response characteristics of the defined group on each task (Stuss et al., 1988). Figures 6.1 to 6.4 present boxplots of the impact intensity of Olympics on Rio de Janeiro in physical, environmental, economic and socio-cultural domains, respectively. In the Figures, the x-axis indicates impact indicators and the y-axis shows impact intensity (rated as very weak, weak, moderate, strong and very strong). Each boxplot shows the range of impacts' intensity values for each question. The horizontal line inside the box shows the median value of the distribution impact intensity.

Physical dimension

Figure 6.1 illustrates experts' opinions about physical impacts intensity of Rio Olympics using a boxplot graph. The highest negative impacts belong to heavy construction of unnecessary facilities (*e.g.* sport) followed by insufficiency of physical facilities such as parking spaces. The highest positive impacts are related to development of tourist capability in hotel industry as well as public improvement of infrastructure in the Olympic surroundings area. Likewise, as Figure 6.1 displays, there is no significant strong impacts on the domains of upgrading transport network, stimulating transport improvement or even public facilities development. There are seven (7) values as outliers which indicate variation in the range of responses which implies less alignment between experts about the impacts intensity of sport mega-event in Rio de Janeiro.

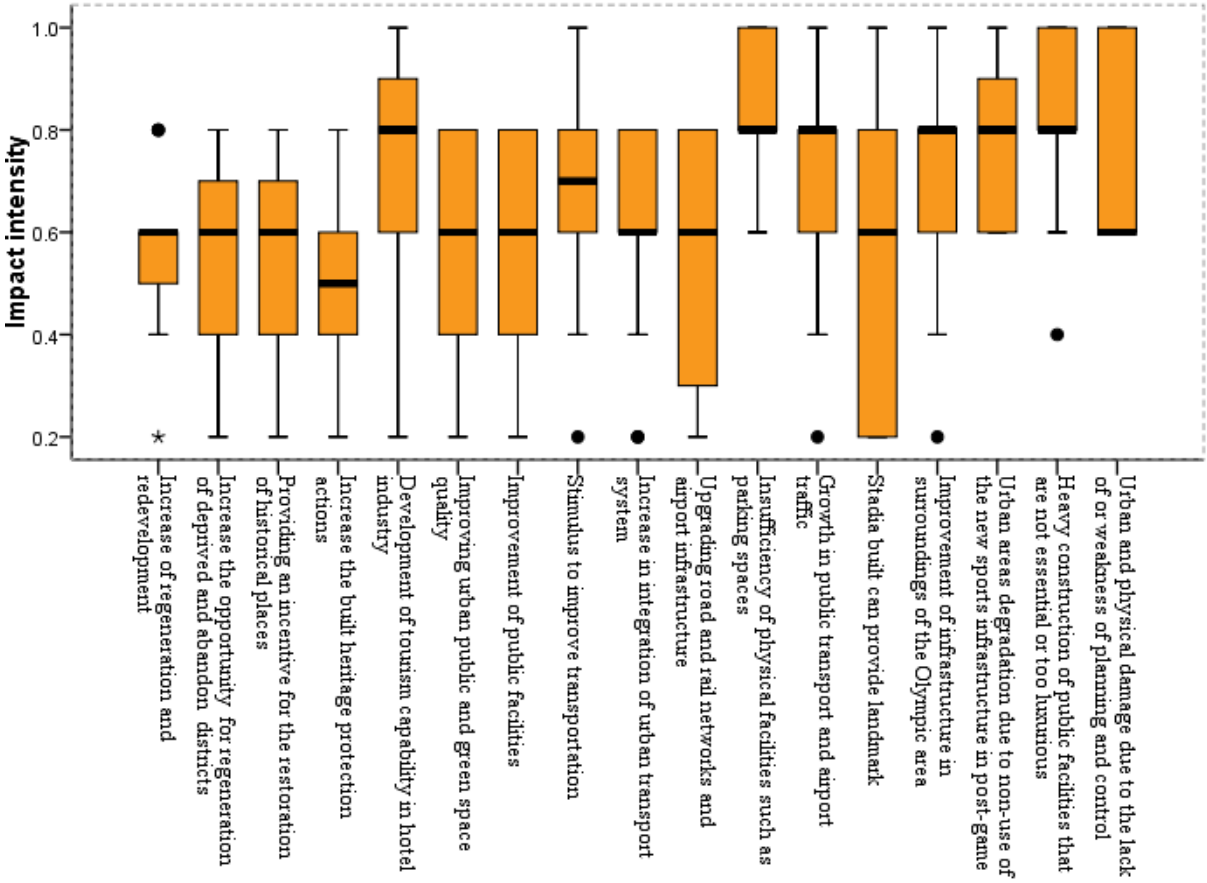


Figure 6.1: Boxplots of impacts intensity with the physical indicators

Source: own work, 2018

Environmental dimension

Figure 6.2 shows the boxplots of experts' opinions about Rio Olympics' environmental impact intensity. These boxplots demonstrate that experts are unanimous in the negative impacts regarding air pollution and carbon footprint, high consumption of water, energy and non-recyclable waste and also environmental damage due to the absence of monitoring programs for environmental damage. The boxplots of the environmental dimension depict very weak impacts of developing green transport and green environment, opportunity to improve air and water quality, waste disposal and clean energy development as well as the creation of new principles for environmental protection, respectively. The highest positive impact is related to increasing awareness with natural environment. Nevertheless, the intensity is ranked as weak. Generally, there is alignment among experts' opinions in terms of environmental negative impacts of Rio Olympics.

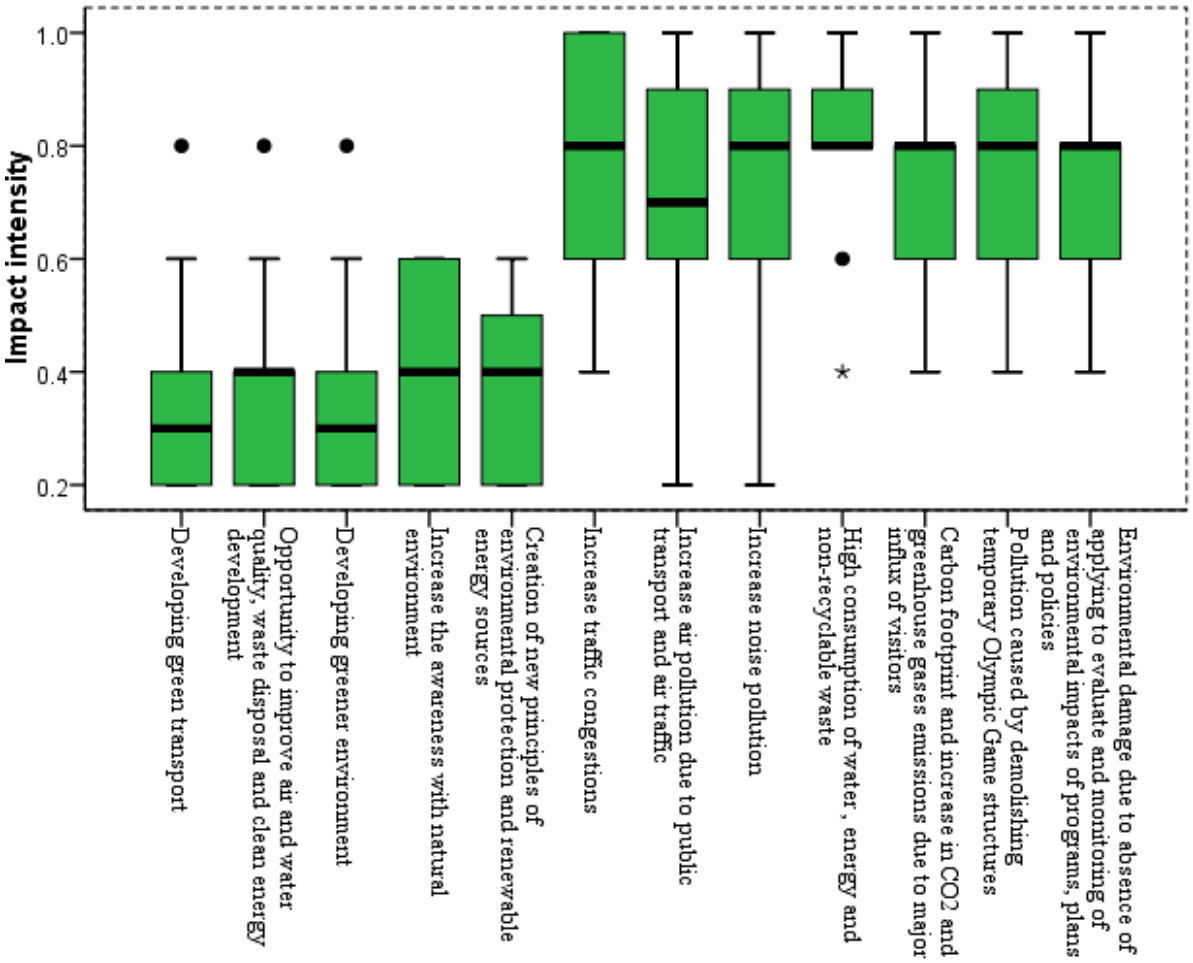


Figure 6.2: Boxplots of impact intensity with the environmental indicators

Source: own work, 2018

Economic dimension

Figure 6.3 shows the boxplots of experts' opinions about Rio Olympics' economic impact intensity. Increasing the prices of goods, services, elimination or postponement of health and education investments due to staging the Games and growth of security costs show very strong negative impacts respectively. Boxplots also reveal that spending money in lavish sports facilities and increasing tax rates are mentioned as strong negative impacts. According to experts there is moderate impact on host city economy promotion. However, local trade growth due to visitor expenditures and investments attraction in infrastructure and new facilities are perceived as having strong positive economic impacts. Indeed, boxplots indicate unanimity among experts about the economic impacts intensity of sport mega-events on the city. In other words, from the experts' views, Olympic Games more likely may not bring long-term economic improvement to Rio.

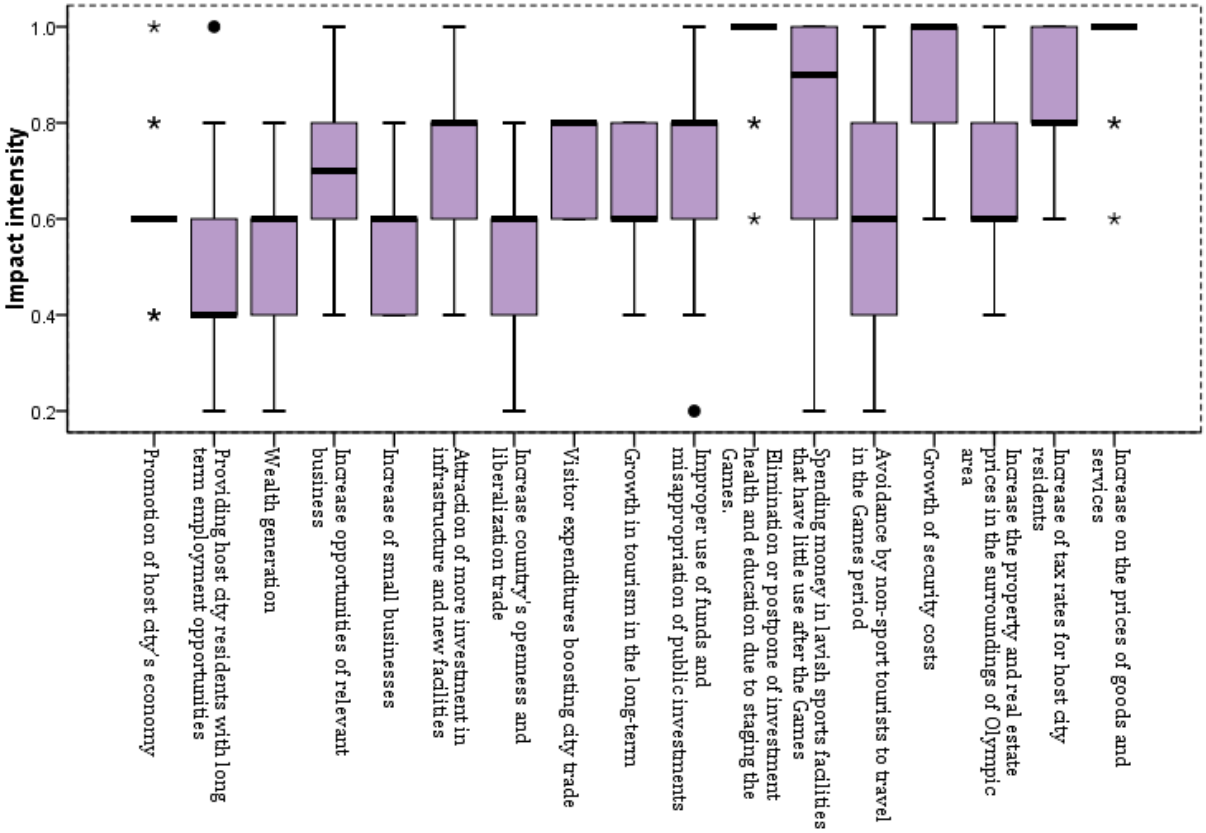


Figure 6.3: Boxplots of impact intensity with the economic indicators

Source: own work, 2018

Socio-cultural dimension

Figure 6.4 shows the boxplots of experts' opinions about Rio Olympics' socio-cultural impact intensity. These results show that there is an alignment between experts about a very strong negative impact on pushing away poor people who have previously lived in the Olympic area. Likewise, there is a very weak positive impact on poverty reduction. Indeed, according to experts' views the Olympic Games were not effective in reducing poverty and improving the quality of life of citizens. They also had weak impact on public health promotion. Moreover, the survey shows that host citizens strongly distrust authorities due to lack of transparency. It is important to mention that, stakeholder involvement plays a main role to solve social problems (Klein, 2015).Transparency is necessary and it can increase trust between decision-makers, authorities and public stakeholders. "Transparency in decision-making will enhance when stakeholders actually get to know and are part of the logics behind scientific approaches" (Soma et al., 2017). However, the highest positive impacts belong to putting the host city on the map, increase international reputation followed by raising the chance to meet new people and cultural exchange.

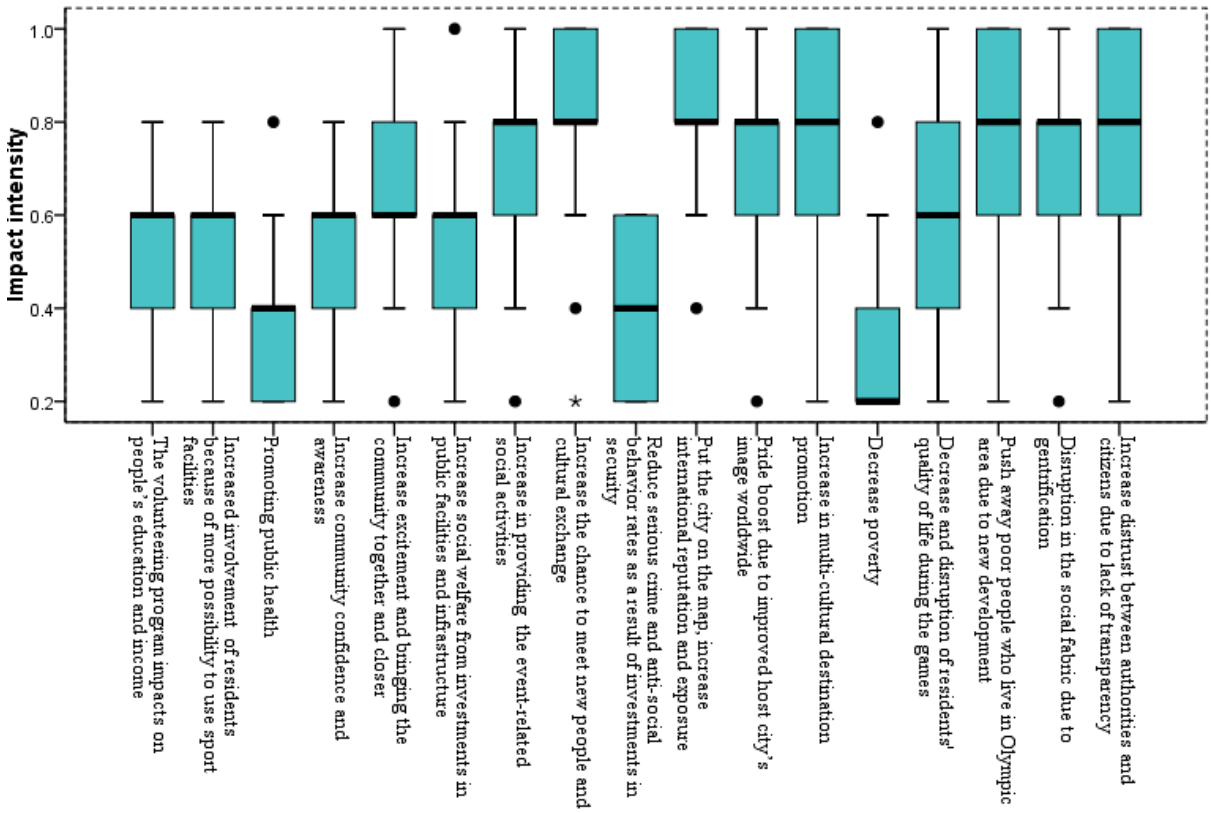


Figure 6.4: Boxplots of impact intensity with the socio-cultural indicators

Source: own work, 2018

6.3 Synthesis

This chapter presented the analysis of the conducted survey on sport mega-events impact intensity on Rio de Janeiro in all four dimensions including physical, environmental, economic and social-cultural. The results display a significant alignment among experts' opinion about negative impacts intensity of Rio Olympics in all studied dimensions. However, there was substantial agreement in terms of some positive impact intensity in social-cultural dimension such as increase the chance of meeting new people and cultural exchange and putting the city' on the World map. The performed quantitative analysis based on experts' views on environmental sustainability revealed the negative impacts of hosting the Games. Overall, the results obtained from the data questionnaire survey through Wilcoxon Signed Ranks Test clearly revealed that the 2016 Olympics likely brought more negative impacts to the city in all dimensions, according to the Brazilian experts.

In the physical dimension, the highest positive and negative impacts are related to development of tourist capability in hotel industry and heavy construction of unnecessary facilities, respectively. In the environmental dimension, the highest positive and negative impacts are related to increasing awareness with natural environment and weakness in improvement of green transport and green environment, respectively. In the economic dimension, the highest positive and negative impacts are related to local trade growth and increasing the prices of goods and services, respectively. In the socio-cultural dimension, the highest positive and negative impacts are related to putting the host city on the map and pushing away poor people who have previously lived in the Olympic areas, respectively.

Next chapter will discuss the Olympics urban sustainability in Rio based on experts' survey, as well as the potential problems of four selected Olympic areas and post-event usage urban planning.

Chapter 7： Discussion of sport mega-event impacts on Rio de Janeiro

7.1. Introduction

The central argument for hosting the Olympic Games is their sustainability impacts on host city. One of most common problems in host cities is post-event use of event-related infrastructures and their maintenance.

Although, the Olympics are commonly seen by governments as an opportunity for a city to go through more profound urban transformation, that creates long-term investment in city infrastructures. In reality, the promise of their positive impacts in a host city becomes an argument for justification of the enormous amount of public money invested in the mega-event. However, the evaluation and monitoring of physical development impacts of events has received even less attention. Recently, Rio de Janeiro has gone through tremendous physical changes through hosting the sporting events. But, the essential question is, what the city has gained at the end of only 45 days of Olympics and Paralympics. The urban interventions connected to the 2014 World Cup and the 2016 Olympics involved deep transformations in the urban dynamics of Rio de Janeiro. These massive investments make it necessary to deepen the analysis of their positive impacts and clarifying what the Games did provide for the city.

The phase of preparing the city for staging the events, including Olympic areas development and transportation system improvement, is fully explained in the previous chapter. This chapter investigates whether the urban sustainability transformation is realized in the preparation and transition process for the Olympics, as the event relevant organizers presented in the bidding process. This discussion chapter largely focuses on two themes: first, urban sustainability analyses based on experts' survey and, second, the four Olympic areas will be discussed in greater detail.

This chapter is organized as follows: after a brief introduction, the chapter begins with a comparative and qualitative assessment of the level of urban sustainability through mega-events. The subsequent section presents a critical discussion of the impacts in Olympic areas development, already described in Chapter 5 in terms of physical and environmental dimensions. The chapter concludes with a comparison between event-related urban interventions in Barcelona and in Rio de Janeiro.

7.2. Comparative analyses of degree of urban sustainability in Rio de Janeiro mega-event

Sustainability assessment is a tool that can be employed for better conceptualizing and defining urban sustainability (Cohen, 2017). It provides a frame for better defining and understanding the sustainability enterprise for multiple domains, including urban development (Pope et al., 2004; Singh et al., 2009).

In this section, in order to identify the degree of urban sustainability transformation while focusing on physical changes through hosting the 2016 Olympics, a qualitative in-depth analysis was conducted, based on experts' views (impact indicators) and selected sustainability sub-themes which is presented in Chapter 3 (table 3.1). The aim of the qualitative method is to understand experience as unified. They are appropriate to this type of research as qualitative descriptions can play the important role of suggesting possible relationships and dynamic processes. In this thesis, the qualitative comparison assessment is based on my own interpretation from the research and study of each dimension (physical, environmental, economic and socio-cultural). Indeed, this analysis is helping to reveal the likely sustainable achievement or unsuccessful development objectives of holding a sport mega-event in the city of Rio de Janeiro. The comparative analysis between impact indicators and sustainability sub-themes is conducted for all physical, environmental, economic and socio-cultural dimensions (Baroghi et al., 2018). The scoring system was set from extremely low (-2) to (2) extremely high as described in Chapter 3. The last part of this chapter assesses the degree of urban sustainability through Olympics sport mega-event in Rio de Janeiro.

7.2.1. Physical impacts sustainability Analysis

The results' relationship between physical impact indicators and sustainability sub-themes is illustrated in table 7.1. Analyzing physical sustainability sub-themes and impact indicators shows that physical sustainability sub-themes, namely public and green spaces improvement and transport system infrastructure development in Rio de Janeiro, have a nearly successful performance. While, other sustainability sub-themes relevant to staging events such as sustainable land use planning, focusing on usable sport infrastructures and urban equipment improvement, shows negative impacts on urban sustainability.

Table 7.1: Relationship between physical impact indicators and sustainability sub-themes

Impact indicator	Sustainability sub-theme			
	Sport infrastructures	Urban mobility/ transport facility	Green, public space and public facilities	Sustainable land use
Improvement of infrastructure in surroundings of the Olympic area				1
Stimulus to improve transportation		1		
Increase in integration of urban transport system		1		
Increase of regeneration and redevelopment		1		
Improvement of public facilities			0	
Improving urban public and green space quality			1	
Providing an incentive for the restoration of historical places				1
Upgrading road and rail networks and airport infrastructure		1		
Increase the opportunity for regeneration of deprived and abandon districts				-1
Increase the built heritage protection actions				-1
Stadia built can provide landmark				1
Urban and physical damage due to the lack of or weakness of planning and control				-1
Urban areas degradation due to non-use of the new sports infrastructure in post-game	-2			
Heavy construction of public facilities that are not essential or too luxurious	-2			
Insufficiency of physical facilities such as parking spaces		-2		
Total	-4	2	1	0

Source: own work, 2018

7.2.2. Environmental impacts sustainability analysis

The results of the relationship between environmental impact indicators and sustainability sub-themes are illustrated in table 7.2. In connection with environmental sustainability, the relationship between impact indicators and sustainability sub-themes, shows that hosting mega-events have failed to fulfill any of sustainability sub-themes goals such as clean transport, air pollution reduction, water cleaning, waste reduction and reduced consumption

of non-renewable natural resources and construction materials as well as the conservation of natural heritage. Indeed, many environmental commitments have not been met in Rio de Janeiro contrarily to what was in the candidacy files.

Table 7.2: Relationship between environmental impact indicators and sustainability sub-thems

Impact indicator	**Sustainability sub-theme**				
	Clean transport	Air pollution reduction	Noise pollution	Waste reduction	Minimizing of the consumption of environmentally harmful construction materials
High consumption of water, energy and non-recyclable waste				-2	-2
Increase traffic congestions		-2	-2		
Increase in CO2 and greenhouse gases emissions due to major influx of visitors		-2			
Environmental damage due to absence of applying to evaluate and monitoring of environmental impacts of programs, plans and policies		-1		-1	-2
Increase noise pollution			-1		
Pollution caused by demolishing temporary structures					-1
Increase air pollution due to public transport and air traffic		-1			
Opportunity to improve air and water quality, waste disposal and clean energy development		-2			-2
Creation of new principles of environmental protection and renewable energy sources	1				
Developing greener environment					-2
Developing green transport	-2				
Total	**-1**	**-8**	**-3**	**-3**	**-9**

Source: Own work, 2018

7.2.3. Economic impacts sustainability analysis

The results' relationship between economic impact indicators and sustainability sub-themes is illustrated in table 7.3. With regard to economic sustainability, the relationship between impacts indicators and sustainability sub-themes in staging the mega-events,

sustainable goals have not been achieved in the context of economic promotion, produce long term tourist interaction and long-term employment opportunities. The costs of sport infrastructures for both events, World Cup and Olympics, were more than the original estimate, for example, the expenditures for the national stadium were almost double (Horne & Whannel, 2016). Likewise, costs over run when building some of the Olympics venues because of wetlands ground (Gaffney, 2010). Rio de Janeiro actually shows little economic improvement through infrastructure development and any economic promotion from the events were short and temporary (Global Credit Research, 2016).

Table 7.3: Relationship between economic impact indicators and sustainabiliy sub-themes

Impact indicator	**Sustainability sub-theme**				
	Economic promotion	Long term employment opportunities	Tourism growth	Small business	finance
Increase on the prices of goods and services	-2				
Increase the property and real estate prices in the surroundings of Olympic area	-2				
Improper use of funds and misappropriation of public investments	-2				
Spending money in lavish sports facilities that have little use after the Games					-2
Growth of security costs					-2
Elimination or postponement of investment health and education	-2				-2
Attraction of more investment in infrastructure and new facilities					-2
Visitor expenditures boosting trade				-1	
Increase of tax rates for host city residents				-2	
Avoidance by non-sport tourists to travel in the Games period			0		
Promotion of city's economy	-2				
Increase opportunities of relevant business			1	1	
Growth in tourism in the long-term			0		
Increase of small businesses				0	
Increase country's openness and liberalization trade	0			0	
Providing host city residents with long term employment opportunities		-2		0	
Providing host city residents with long term employment opportunities	-1				
Total	**-11**	**-2**	**1**	**-2**	**-8**

Source: Own work, 2018

According to the Country Report of Brazil (BTI 2018 Country Report, 2018) economic indicators of Brazil such as GDP growth and unemployment rate have sharply fallen between 2013 and 2016, coinciding with the preparation and hosting of the World Cup and Olympic Games. GDP growth declined from 3% in 2013 to -3.6% in 2016 and the unemployment rate respectively increased between from 7.1 % to 11.5 %. Table 7.4 illustrates economic indicators of Brazil in this period.

Additionally, Rio was facing a heavy financial and economic crisis, with government in chaos just one year after the Olympics (Frigola, 2018). Under such economic and political conditions, focusing on environmental sustainability is compromised or impossible, especially from a financial standpoint (Trendafilova et al., 2017).

Table 7.4: Economic indicators of Brazil between 2013 and 2016

Years	GDP $ M	GDP growth %	Unemployment %
2013	2472807	3	7.1
2014	2455993	0.5	6.8
2015	1803653	-3.8	8.5
2016	1796187	-3.6	11.5

Sources (as of October 2017): BTI 2018 | Brazil Country Report, adapted from: http://www.bti-project.org/de/berichte/laenderberichte/detail/itc/bra/ity/2018/itr/lac/

7.2.4. Socio-cultural impacts sustainability analysis

The results' relationship between social-cultural impact indicators and sustainability sub-themes is illustrated in table 7.5. In connection with socio-cultural sustainability, the relationship between impact indicators of mega-events and urban sustainability sub-themes in the hosting of mega-events, it is more unlikely that they are able to bring sustainable development in terms of poverty reduction, public health and, urban justice to host residents. On one hand, poor people who lived in the mega-events' sites (*e.g.* Olympics area) were relocated away from the area. On the other hand, unequal access to services may ultimately lead to social inequality which jeopardizes urban justice. However, urban sustainability has been perceived fairly in field of world city status (city branding) and social activities.

In association with urban safety and security, Rio achieved very positive results in creating neighborhoods' security between 2008 and 2016. However, safety after the Games could not continue and, just one year after the Olympics, insecurity is once again rising up and the criminal gangs´ activities started to grow up, according to Frigola (2018).

Table 7.5: Relationship between social-cultural impact indicators and sustainability sub-themes

Impact indicator	**Sustainability sub-theme**						
	Poverty reduction	urban justice	urban safety	public health	World-city status (city branding)	Urban tourism	social activities
Put the city on the map					1		
Increase distrust between authorities and citizens due to lack of transparency		-2	-2				
Increase in multi-cultural destination promotion						1	
Increase the chance to meet new people and cultural exchange			1				
Disruption in the social fabric due to gentrification	-2	-2					
Push away poor people who live in Olympic area due to new development		-2					
Pride boost due to improved city's image					1		
Increase in providing the event-related social activities	1		1				
Increase excitement and bringing the community together and closer							1
Decrease and disruption of residents' quality of life during the games			0				
Increase social welfare from investments in public facilities and infrastructure				1			0
The volunteering program impacts on people's education and income	0	0					
Increased involvement of residents because of more possibility to use sport facilities							0
Increase community confidence and awareness							0
Reduce serious crime and anti-social behavior rates as a result of investments in security			0				
Promoting public health				-1			
Decrease poverty	-2						
Total	**-3**	**-6**	**0**	**0**	**2**	**1**	**1**

Source: Own work, 2018

Overall, the twofold results obtained from the questionnaire survey analysis (Wilcoxon Signed Ranks Test) presented in Chapter 6, as well as comparing sustainability sub-themes with impacts indicators clearly demonstrated that hosting the mega sport events likely have more negative impacts on Rio de Janeiro in all dimensions. The results also confirm previous studies described in the literature review. Indeed, comparing the impact indicators with sustainability sub-themes, there are significant gaps between the established physical, environmental, economic and socio-cultural objectives of hosting the Games and likely urban sustainability.

7.3. Discussion of Olympics areas development plans

This section evaluates the Olympic-related development plans in Rio which is further explained in detail in Chapter 5. The prospective approaches to Olympics in Rio was very different and can be associated with a critical understanding about new aims at urban planning (Rojo, 2013; Mascarenhas, 2011).

To determine whether planning and management in four Olympic areas was successful in positive intervention, or not would, therefore, require discusses the factors were involved in the planning process. The ensuing discussion focuses on the physical and environmental impacts or consequences of event-related development in these four areas.

7.3.1. Olympic land use planning analysis and post-event usage

Event-related site location

There is a concern about how mega-events can divert from a long-term development plan. Building massive new sport infrastructures pose the main challenges of what to do with them after the Games. There is no "after" for sport infrastructures without a well-defined "before". This means good planning. It doesn’t make any sense to build new sport infrastructures without previously having a plan for their future use (Millet, 1997). This author also

suggested that "Olympic Village recycling cannot be left to chance right up to the day of the Games' closure". Event-related urban interventions involve two phases of planning: one that prepares and transforms urban space for a mega-event and, the next that adapts event spaces for long-term use (Smith, 2014). In preparation for hosting an event, what is often required is different from what was already built in the city. Large-scale sport infrastructures due to their nature often bear more the burden and further costs than being useful for future uses. It requires additional massive investment (Neto et al., 2018) and planning to convert them to appropriate scale structures for local use. This important issue is often not envisaged initially. As mentioned in literature review in some previous Olympic cities, after the Games, they were abandoned or underutilized and became "white elephants" or they were demolished.

The site selection for a sport mega-event is a crucial step in event planning and has the potential to succeed or fail in accelerating urban improvement process and post-event usage of event-related infrastructures and facilities. Schwambach (2012) has highlighted that Rio' Olympics zones were located in different areas of the city, and all efforts were focused on the four zones' improvement, connecting them with the mobility project and beautification of the surrounding areas. Although the Rio Organizing Committee suggested that the Olympic Games provide an opportunity to renovate fragile natural areas as well as to improve functioning of transportation systems, lack of available space in the city caused to choose the wetlands of Barra de Tijuca as the main Olympic area, an inappropriate location and far from city center. Most Olympic infrastructures and venues were built on this area. In terms of territorial strategies and site selection for the 2007 Pan-American games and the 2016 Olympic Games, there are some convergences between both mega-events.

In Rio, there is an extreme functional gap between the city's productive areas and its poor residential neighborhoods (Frigola, 2018). In such divided city into rich and poor regions, selecting Barra da Tijuca for developing Olympic facilities, implies the continuity strategy of urban territory redetermination (Bienenstein et al., 2012). Whereas the problematic areas in the city were not involved in the opportunity created by the Olympics. Selecting the south region of the city may let to unused facilities which had already happened after the 2007 Pan American Games. The Pan American Village was built on peat land with high underground humidity which was not appropriate for heavy construction. Accordingly, the foundations of the buildings reached a depth of nearly 50 meters. The Village, because of the poor construction quality, has subsequently required expensive interventions (Curi et al., 2011). More than five years past, 40% of the Village units were still unoccupied and stood empty (Soveral, 2012).

Similarly, the general problem of future uses of event-related infrastructure occurred after the 2007 Games by the unfulfilled promises which led to more costly Games than previously predicted. For example, the Velodrome was demolished because the cost of upgrading the venue to Olympic regulations was seen as equally expensive as building a completely new venue (Andrew, 2013; Lavelle & Troop, 2015).

The location of Olympics indicates a lack of consideration of where facilities are located, as well as ignoring the post-event usability. It also intensifies the imbalance distribution of urban infrastructures in the entire city and reduces accessibility to whole inhabitants. The location of the Olympic area also shows conflicts of attempt, where the richer areas achieve more investments and the poorer ones achieve less or none (Schwambach, 2012).

Indeed, the wealthy parts of Rio and, the large development companies were the ones who benefitted from huge infrastructure projects more than others. Moreover, the Olympic area in Barra da Tijuca is witnessing an increase in real-estate prices with growth in construction of shops, houses and hotels. Of course, the sites where the actual Games facilities were located have been improved, especially in terms of urban and transportation infrastructures.

Olympic land use planning analysis

On the basis of the argument above about site selection, the impacts and consequences have resulted in deficiencies in Olympic-related urban planning. These are discussed below:

- Since 2000 planning to host sport mega-events in Rio (2007 Pan Americans Games, 2014 World Cup and 2016 Olympics), Barra da Tijuca region has experienced considerable changes in land cover and demographics by event-related development and occupation of sport infrastructures, commercial and residential areas and transport networks (Viegas et al., 2018). As noted in Chapter 5, the one reason to choose Barra da Tijuca area as one of the Olympic zones, was creating a new modern urban center in the western part of Rio de Janeiro. These urban investments were all on a trajectory to change the center of Rio and moving away from its historical center to westwards (Srinivas, 2016). The Olympic Village, Olympic Park and other sports arenas have failed to consolidate a center of activity in Barra da Tijuca due to lacking of services, in this peripheral neighborhood, as stated by Frigola in 2018. However, in the South

zone (Zona Sul) which was planned as to be one of the four new urban centers, its goal has not been realized and the zone is just the same as before (Frigola, 2018).

- Barra da Tijuca is mainly one well-equipped residential area with fast growing luxury housing. Choosing this area to Olympic-related development prevents the Olympics role as a stimulator of urban interventions in deprived areas, especially when 60% of the Rio 2016 Olympic Park area was planned as closed condominium (Gaffney, 2015). This site selection benefitted elite residents and land owners in a wealthy area (Oliveira, 2012; Vannuchi & Criekingen 2015) while, in the previous Olympic cities, such as Barcelona and London, Olympic infrastructures have been developed in deprived or brownfield areas in order to being trigger for urban regeneration.

  Urban transformation in Rio de Janeiro was, thus, undermined by concentration of the Olympic-related planning and development in the upper middle-class areas of Barra da Tijuca and far from poor urban areas with high population density. It is expected that Olympic structures in Barra will further increase the economic inequality between the area and its surroundings. Consequently, the spending of huge amounts of public resources in a wealthy area may intensify existing socio territorial inequalities in Rio de Janeiro.

  In addition, the urban interventions have affected the property prices in areas close to the Olympic area, in south zone, more than anywhere else. For example, property prices in the corridor between Recreio and Barra da Tijuca boosted more than 50% in 2010. Indeed, the development plan for the mega-event, created extremely unequal opportunities and tended to benefit the private sector, entrepreneurs and developers, as with creating recreational spaces for affluent residents as well as the international tourists.

- Despite the event-related physical development, the post-event usage of the Olympics infrastructures and their maintenance are still uncertain (Guerra, 2015; Gold & Gold, 2016). After the Games, Olympic Park and several venues are abandoned and left to fall apart (Armour, 2017). According to Drehs and Lajolo (2017), Brazil's Ministry of Sport solicited bids for private companies to maintain and run the park, but none bid. Likewise, according to the International Olympic Committee's Executive Director (Christophe Dubi), plans for the post-Games usage of several venues, including the aquatics center in the Olympic park, were not implemented (Grohmann, 2018). As mentioned, Rio 2016 legacy hasn't materialized due to the political landscape and the

social and economic situation. Figure 7.1 shows abandoned Olympic Park and venues in Rio.

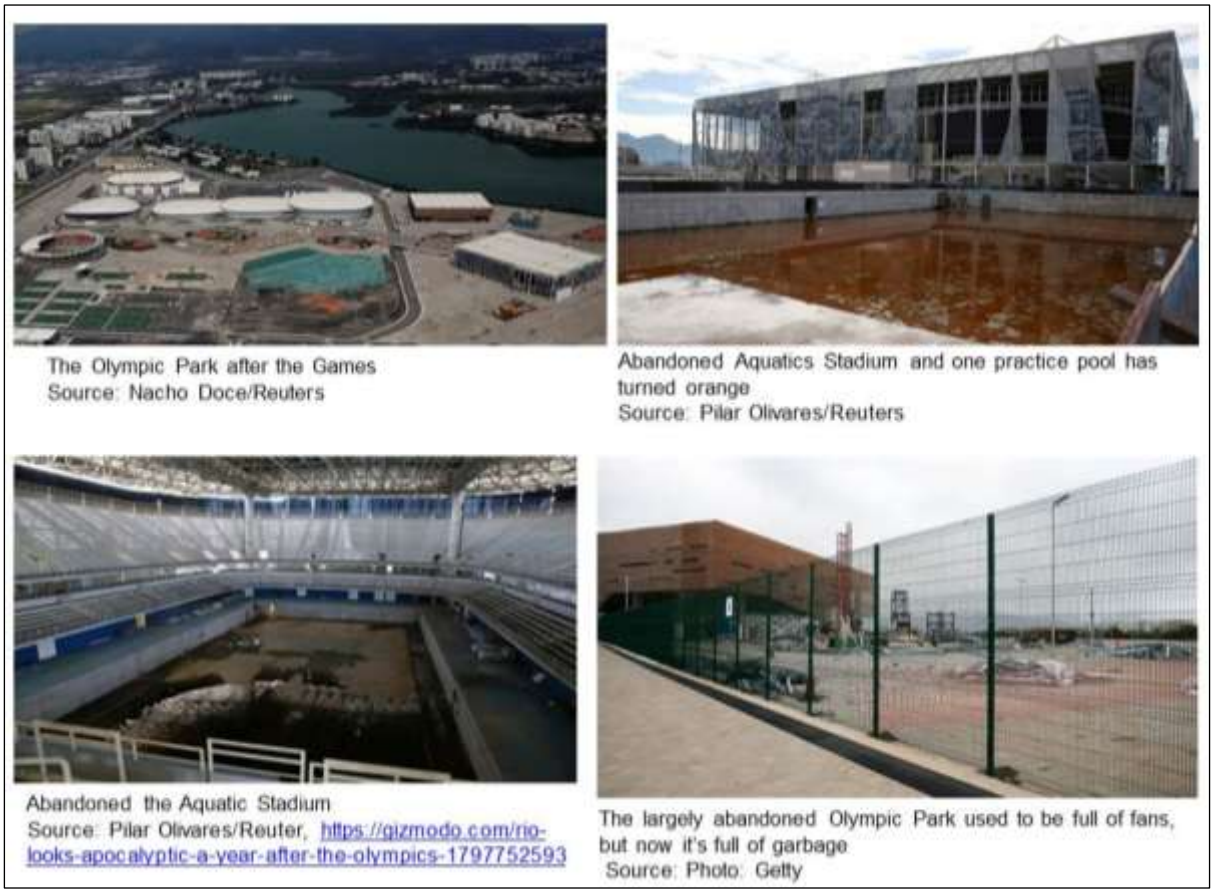


Figure 7.1:Abandoned Olympic Park and Olympic Village

Source: http://www.businessinsider.com/rio-olympic-venues-are-abandoned-just-6-months-after-games-2017-2#the-media-center-was-recently-demolished-and-is-now-a-health-hazard-17

Deodoro Olympic zone was addressed by city authorities and politicians as a way to improve one of Rio's poorer neighborhoods. Although, some improvement in terms of transportation facilities and public spaces has been achieved, however, no real dynamics of urban transformation has been established in this area (Frigola, 2018). Deodoro Olympic site has been closed after the Games. Likewise, Deodoro Aquatic Centre was shut down and remains unused (City Hall website, 2017).

In fact, there are conflicts between the municipal government and private organizations in the management of those venues (Charner & Darlington, 2017). Therefore, the future of the second-largest Olympic zone is still uncertain. According

to Brazil's Federal Court of Audit (TCU) sport facilities such as pools in Deodoro Aquatics Center are abandoned and covered by bugs, mud and rodent feces (Drehs & Lajolo, 2017).

- In the case of Maracana stadium, it was not only one of the biggest and most luxurious stadiums in the world, but it was also well known for its functionality and security. The legacy of Maracana landmark stadium is also unclear. Six months after the Olympics, due to a series of legal conflicts, it was already in a state of total decay (Charner & Darlington, 2017). Figure 7.2 shows abandoned Olympic Maracana. Furthermore, a power shut off happened after disagreements over who was responsible for the electric bill (Drehs & Lajolo, 2017). Also several windows and doors have been broken or damaged and nearly 10% of the stadium's 78,000 seats are missing (Charner & Darlington, 2017). Figure 7.3 shows the results of vandalism and violent robberies in Maracana Stadium.

Figure 7.2:Maracana Stadium fallen into a satae of abandon, 2017

Source: Vanderlei Almeida—AFP/Getty Images/http://time.com/4672303/rio-olympics-venues-pictures/

Figure 7.3: Vandalism and violent robberies in Maracana Stadium in 2017

Silvia Izquierdo/AP

Source: http://www.businessinsider.com/rio-olympic-venues-are-abandoned-just-6-months-after-games-2017-2#the-media-center-was-recently-demolished-and-is-now-a-health-hazard-17

- Mega-events can be an opportunity to minimize housing shortage in a host city. In this context, the Olympic Village usually provides for affordable housing for the host residents, after the event. In relation to Rio Olympic Village, planning for post event usage, indicated converting the nearly four thousand massive complexes of 31 high-rises towers into housing for citizens. The complex was built with state government subsidies for the middle and upper classes (Gaffney, 2015). Indeed, they were set to be transformed into luxury apartments which aggravates Rio de Janeiro´s severe shortage of affordable housing. Less than 10% of the Olympic Village units were sold at the time (Watts, 2015). But, now, the majority of them are still vacant (Drehs & Lajolo, 2017; McBride, 2018). Figure 7.4 illustrates abandoned sites of the Olympic Village.

  Rio Olympic Village was planned to serve as a new neighborhood through a mixed-use development, with mixed residential and commercial activities and all other urban facilities including open space, public park, and recreational facilities on the street level. However, in reality, a mixed urban planning is not realized and a big shopping mall is planned to occupy a plot near the prominent high-rise residential towers. Likewise, there are not any planned schools, health center, day-cares or other facilities which are required in the neighborhood (Sanchez & Essex, 2017). It is worth

mentioning that, in relation with planning for the Olympic Village, it is not only dependant on its design characteristics (location, architectural style, quality standards and accessibility), but also it depends largely on the city's choice on urban planning strategy for hosting the event (Millet, 1997).

Figure 7.4: The abandoned Olympic Village, despite plans to turn the building into luxury condos

Source: Photo, AP, https://gizmodo.com/rio-looks-apocalyptic-a-year-after-the-olympics-1797752593

- Athletes Park is another Olympic-related facility in which accessibility plays a key factor in the physical impact outcome and sustainable development. Event-related interventions in Rio is mainly created gated public spaces, closed and controlled, isolating these areas from the rest of the city (Schwambach, 2012). Although, it was claimed that the Athletes Park was planned to be public, it has gated access and, the park is completely surrounded by residential blocks (Sanchez & Essex, 2017). Figure 7.5 shows an aerial view of Athletes Park. It is not certain that local residents can access the gated sport and leisure facilities. A similar example of sport facilities

isolation by building walls and barriers around them, had also occurred in the 2007 Pan American Games (Schwambach, 2012).

Creating gated residential districts shows, in fact, the privatization of public realms, which is one of the fundamental attitudes in Rio's urban development especially in Barra region that is defined by segregation of communities. According to these attitudes, some public facilities, such as public schools, are inserted by the municipality into the private complexes according to their size, number of units and location (Soveral, 2012). Soveral also highlighted that insecurity and segregation made Barra a model of gated and closed condominiums.

Sanchez & Essex (2017) stated the same, five years later, that the character of Olympic Village appears as a condominium rather than as a neighborhood. It is focused on personal vehicle and car-dependence (Gaffney, 2015; Zimbalist, 2017) and pedestrians do not play a role in the mobility, which is not in line with urban sustainability.

In general, on one hand, urban design and planning of the Olympic Park and Olympic the Village with single functional zoning, car-dependence and poor integration with the rest of the city, reproduce modernist design and planning which has been largely debated and criticized. On the other hand, uneven distribution of amenities with massive urban facilities in some areas and lack of urban amenities in others, generate or intensify urban inequality. It is on the basis of this argument, therefore, that this type of Olympic-related urban development without deliberate planning for future uses undermines its commitment to the sustainability principles and urban sustainable transformation.

An aerial view of Athletes Park, 2013
Source: Buda Mendes/Getty Images/
http://www.vancouversun.com/sports/Photos+Olympic+venues+2016+Summer+Games/9173259/story.html

Street view of gated park, Author, Google map, 2018

Figure 7.5: Athletes Park built for the 2016 Olympics

- The profound transformation of Porto Maravilha is considered, by some scholars, as a successful urban revitalization project in an old port area that had been abandoned for decades (Frigola, 2018; Oliveira et al., 2015) pointed out that the regeneration of the region's cultural heritage is a positive consequence of the Porto Maravilha project. Every urban transformation project is the result of the interaction and cooperation between the multiple interests of the stakeholders. However, the project has been criticized for over-development, increased traffic flows, lack of provision of local services and also actual local participation. Therefore, some local communities have stated that their demands have not been met (Oliveira et al., 2015). The mix between residential and commercial uses was one of the main concerns. While the regions' survival depends on the mix of uses and dynamics that such projects can generate for the area, it also implies inequality development in urban spaces through planning to remove informal and poor neighborhoods from surroundings. This process may lead to intensify unsustainability in urban development between poor and affluent areas instead of providing a better quality of life for all citizens. It should also be noted the risk of urban entrepreneurship being more concerned with the interests of developers than to meet the needs of the local population.

Event-related transport facilities development

Sport mega-events were seen as an opportunity for Rio de Janeiro to improve urban mobility. The new transport links seek to improve city connectivity and consequently to improve quality of life in the future. Despite the positive impacts of transportation system development on urban improvement, neglecting the priorities of the city needs in new transport investments, may not lead to real urban transformation. The Olympic-related transport development impacts are discussed in greater detail below:

- The main Olympic-related new transport connected the four Olympic zones (Barra da Tijuca, Deodoro, Maracana and Copacabana) with each other. Despite the fact that the north part of the city due to rapid population growth had requirements for new transportation development, the wealthier areas of Barra da Tijuca and Jacarepaguá were the most benefited from those projects. They received three of the four planned BRT lines and the subway line 4. The state government argued that the subway greatly improves transit options in the city and, line 4 provides to local people a fast, modern, efficient and sustainable transportation (Nate Berg, 2016). Figure 7.6 shows Olympic-related transport development and subway line 4. However, many large high-density residential areas are not covered by the system, particularly inner city areas to the west and north-west region.
- Although the new subway line has made a real difference to workers living in poorer areas in the north of the city (DW, 2016), but the existing network remains insufficient for the city (Frigola, 2018). Extension of subway line 4 toward Barra da Tijuca was much criticized. Critics such as urban planners argued that line 4 prioritizes access to the event sites and wealthy neighborhoods (Zona Sul and Barra da Tijuca) and neglecting the rest of the city's transit needs. Rogério who is one of the co-authors of the "manifesto for a better route for the Rio subway line 4" stated that line 4 was necessary, but it was not the priority. They had other lines that are more necessary (Nate Berg, 2016). It also argued that the event-related transport system development has increased inequality accessibility among different income groups (Pereira, 2018).

  In order to compensate for the lack of subway access in other parts of the city, a network of bus rapid transit lines was planned. Four BRT lines were created to

connect the four Olympics zones in the city, and to connect them with the subway, suburban rail lines and the airport (Nate Berg, 2016). The new BRT lanes connecting Barra da Tijuca to the city center represented a major investment in both scope and scale as a Rio 2016 transportation project.

- Most transport development was focused on routes to the new Olympic facilities, which did not address the city's most pressing transport needs (DW, 2016; Kassens-Noor, 2016). According to Gaffney et al. (2012) "the confluence of three of the four BRT lines in a 5-km radius is directing urban mobility to this limited region of the city, potentially shifting its urban centrality". Development of more necessary and previously planned lines in decades could be delayed due to the implementation of the Olympic projects. Moreover, in the case of several cycling facilities improvement, the connection of bicycles with the other transport modes, is still lacking (Lobo, 2016). In sum, building a transport network to better meet the needs of the entire city instead of the expansion of one single line can contribute to the development of a more strong public transportation system.
- Excessive use of wetland region by private developers and real estate pressures would likely intensify traffic congestion and compromise environmental sustainability (Sanchez & Broudehoux, 2013). Moreover, the transportation projects for the Olympics included highways and lines of subway that passed through existing neighborhoods and under park areas, reducing water quality and disturbing the natural environment (Gaffney, 2010).
- Additionally, Rio 2016 investments should be compatible with city attitudes and travel culture. For example, in Brazil, bicycle use is strongly associated with lower income groups, and converting car users into bicycle users has proven difficult (Malhado et al., 2013; Wang et al., 2013).

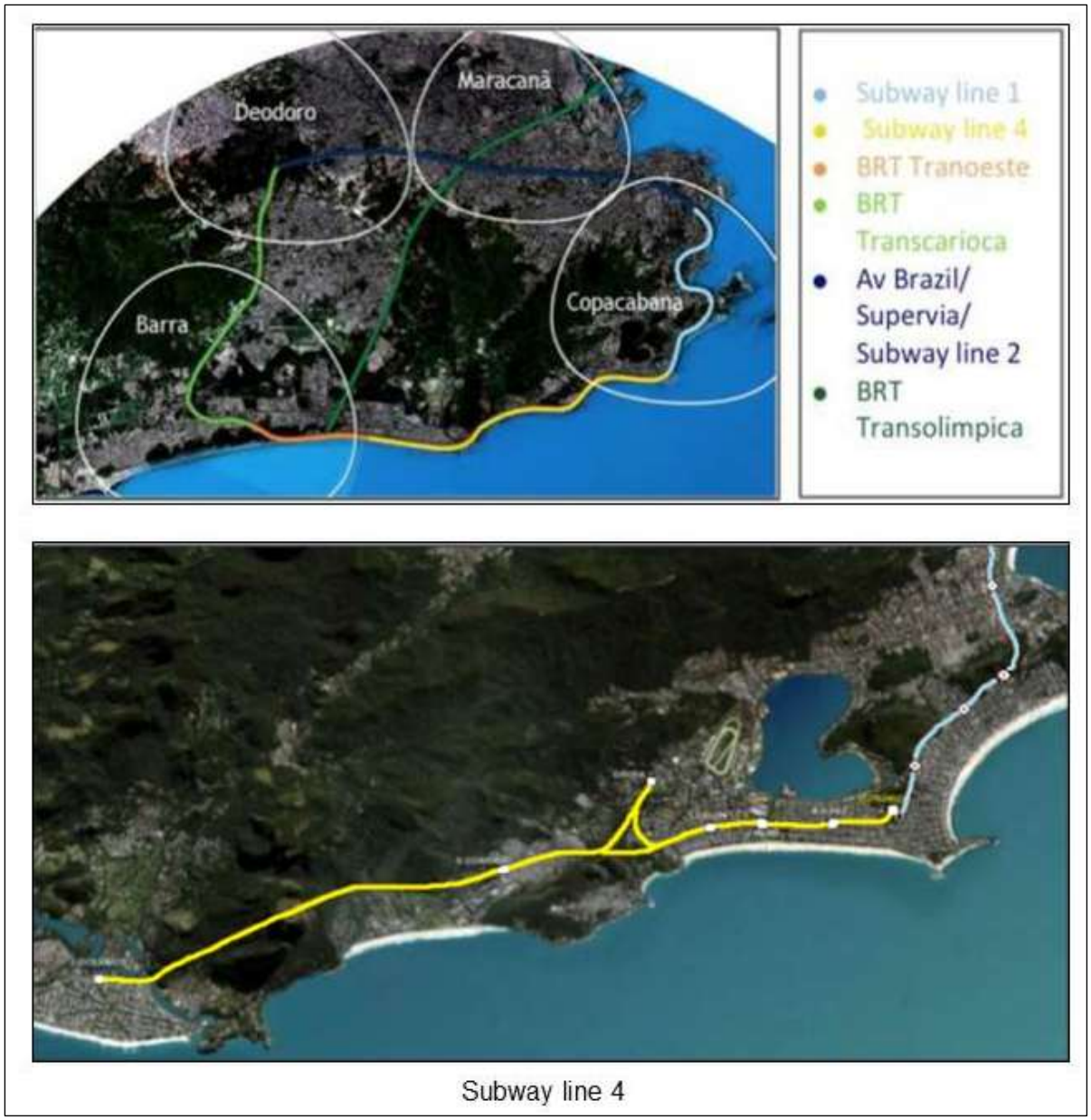


Figure 7.6: Olympic-related transport development, subway line four

Source: www.rio2016.com.br

Eviction problems

Out of the 6.3 million Rio inhabitants, 1.4 million (22% of the city's population) live in one of the 763 slums (favelas) according to the 2010 Census. Most of Rio's informal settlements are located in western and northern part of Rio de Janeiro far from the city center and coastal area in southern region (Steinbrink, 2014).

Since 2009, when Rio de Janeiro was chosen to host the 2016 Olympics, an estimated 3,000 families have been evicted from their homes (Brannon, 2015). Event-related urban interventions threatened local neighborhoods and caused local residents dislocation (Romero, 2012). In 2009, Rio's city authorities published a list of 119 informal settlements to be partly or fully removed before 2016 (Gaffney, 2010; Steinbrink, 2014). Likewise, around 5000 families had been removed until the end of 2011 due to the implementation of Porto Maravilha project (Galiza, 2011; Sanchez & Broudehoux, 2013). Estimated displacements due to the World Cup and the Olympics, range between 170,000 and 250,000 people (Montenegro, 2013). Approximately 11,000 families were affected by Olympics projects (Horne and Whannel, 2016).

Implementation of the Olympic-related transportation projects, such as bus corridors (BRT) in more than 150 km, has forced removal of hundreds of low-income communities who were in their trajectory (Gaffney, 2015). According to the Municipal Department for Housing of Rio de Janeiro, 738 families were evicted by July 2013 for the construction of new road alternatives, 666 families because of the Transoeste, and 72 families due to the Transcarioca (The OGI-SAGE/COPPE/UFRJ Research Team, 2014). Figure 7.7 shows local resident's removals between 2009 and 2012 in the Rio de Janeiro.

In many cases, most of the displaced people have remained homeless since the relocation sites are far away from the city and without adequate amenities, such as the access to local schools, health services and public transportation (Human Rights Advocates, 2012). This is a common concern for those living on the fringes of the city (Douglas, 2015). Likewise, the distance aggravated via the poor public transport links, can have a serious impact on residents' job opportunities and mental health (Douglas, 2015). Additionally, absence of appropriate urban planning and integration as well as inflexible design can be highlighted as issues and challenges related to Olympic-displaced local residents (Arrigoitia, 2013).

Unjustified evictions and controversial demolitions entered the public debate (Braathen et al., 2015).

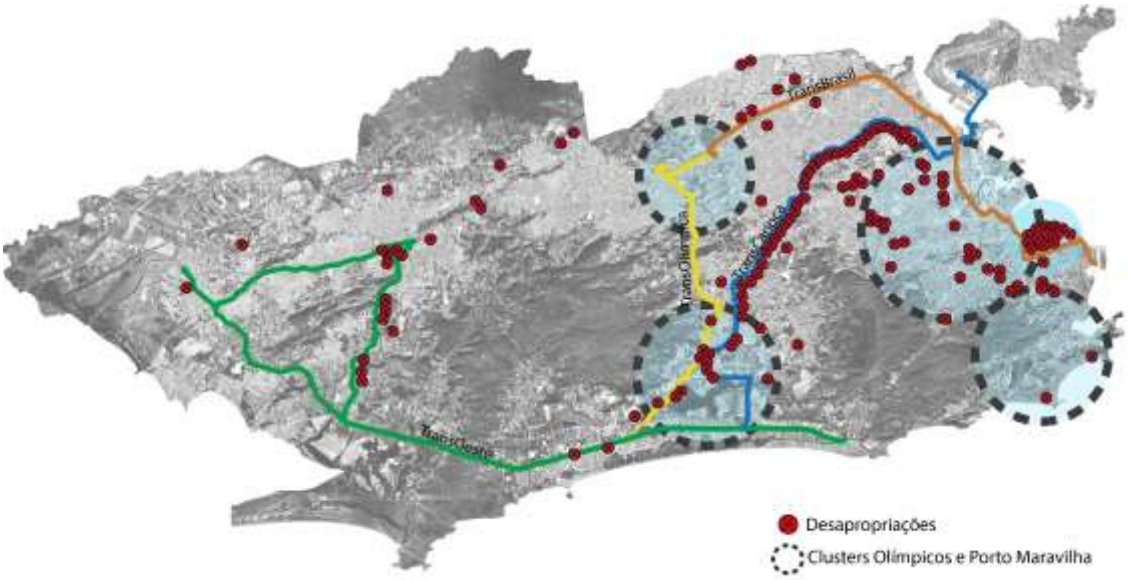


Figure 7.7: Local residents removals between 2009 and 2012 in the Rio de Janeiro

Source: Faulhaber abd Nacif (2013), Pereira, (2018)

One of the poor neighborhoods that were completely displaced is Vila Autódromo, which had an old irregular occupation and was located on the fringes of the Olympic Park. City hall insisted that Vila Autódromo had to be evicted as it stood on the way of a planned walking path. According to Catalytic Communities - a Rio based NGO that works with favelas - around 700 families lived in Vila Autódromo before the clearance began and only around 40 remain (Gregory, 2015). They were relocated to community housing in the western fringes of Rio or received temporary rental assistance and financial indemnities. Figure 7.8 illustrates the Vila Autódromo neighborhood located at the fringe of the planned Olympic Park.

Figure 7.8: The Vila Autodromo nighborhood removal

Source: Getty Images, https://www.nbcnews.com/storyline/2016-rio-summer-olympics/olympic-games-open-community-mourns-demolished-neighborhood-n622861

Additionally, some Olympic-related urban interventions were not realistic, but more cosmetic (Freeman, 2012). This type of intervention in the poor urban areas (favelas) is based on the beautification of poverty and the surrounding Olympics zones rather than on its improvement (Schwambach, 2012; Álvarez Rivadulla & Bocarejo, 2014; Müller & Gaffney, 2018). Although artistic and cosmetic urban intervention decorated the new facades of derelict buildings to create of a sense of vitality, most of the treatments proposed to disguise the poor neighborhoods.

Such top-down solutions result in marginalization of low-income residential areas as well as in social, economic and spatial deprivation. The increasing inequalities and poverty do not show a declining trend, which should be expected, since the inclusion program did not target provision of basic infrastructure and access to quality services for the impoverished communities (European Urban Knowledge Network, 2014; Zahra et al., 2018). Poverty can be considered a central factor to social unsustainability (Soma et al., 2017) that threatens urban sustainability (Zahra et al., 2018).

Physical development was often used by Rio state government and event organizations to justify hosting the sport mega-events. However, there is still an ongoing debate and public criticism about the effectiveness of such sport infrastructure in city development and its goal to provide long-term services to local community.

It is clear that public investment in mega-event-related infrastructure, not only did not benefit a large number of informal settlements and unsustainable areas, but it led to the displacement of some local communities from their homes. Sanchez and Essex (2017) pointed out that alongside several other cases of forced removal and displacement throughout the city carried out by the municipal and state government, the destruction of Vila Autódromo to accommodate a road to the Olympic Park represented one of negative consequences of the events.

Such exclusionary displacements likely have massive negative impacts on long-term urban sustainable development. Hence, the Olympic-related urban transformation model has been destructive and inappropriate. This confirms that event priorities in the city agenda were not aligned with the essential needs of local residents and the city challenges. Indeed, event priorities in Rio became planning priorities (Aaron Richmond & Garmany, 2016) and event requirements for the construction of large and international scale projects displaced urban infrastructure requirements. The Olympic facilities, by their inappropriate scale for local use and their nature, are not often providing full usage by local people. Consequently, as previously mentioned, most sport facilities are abandoned or rarely used, after the Games, having a limited or even no public benefit.

7.3.2. Environmental problems

Since 2009, when Brazil won the 2016 Olympics bidding process, Rio aimed to host the most sustainable games in history, committing to reducing carbon emissions created by

Games, reducing traffic congestion, cleaning up waterways and canals, improving services in the favelas and preserving nature. The environmental sustainability was an issue that government mentioned as an important part of the legacy to be constructed.

According to Lemos (2013) so far, environmental issues have been addressed on project by an approach where strategic concerns and perspectives are not embodied on official practice. This section presents the main key environmental issues due to the Olympic-related projects that have raised concerns.

- One of the strategic objectives of the Rio 2016 Committee in the Management Plan Sustainability Olympic Games was to reduce the impact of projects related in some cases with the introduction of important environmental recovery projects, with emphasis on the water quality of the city's rivers, lakes and beaches in ecologically sensitive areas. In this respect, Guanabara Bay and Lagoon System Jacarepagua were among the most important projects to reduce the pollution by government commitment for the 2016 Olympics. The massive costs of hosting the 2014 FIFA World Cup and 2016 Olympics may have caused delay in the implementation of other projects such as the water pollution reduction projects. Guanabara Bay that was the host site for Olympics' sailing and windsurfing, remains polluted. City authorities promised an 80% clean-up for Guanabara Bay in the bid document, but with discharging of more than 18,000 liters of sewage per second of untreated waste water, mainly via the 55 rivers and canals that flow into it at the time (Sim, 2014, Green news, 2016), only 49% cleaning was achieved until 2015 (Boykoff & Mascarenhas, 2016; Kaiser, 2015). In 2015 Rio Governor pushed back the estimated finish date for cleaning Guanabara Bay from 2016 to 2035 (Barchfield, 2015).This was mainly due to poor planning and financial constraints. Albeit, updated information on pollution control is not available, visual checks on garbage floating on Guanabara Bay have been performed recently. Even if, according to marine biologist R. Paranhos (Carless, 2017) the installed 17 eco-barriers were never expected to have much more than a cosmetic impact on the bay's pollution, the fact remains that, at the time of the Olympics, they only collected about 7.5 percent of the trash flowing into the bay (Figure 7.9). Most of them have subsequently been cut by the local fisherman and, in February 2017, in an area bordering the industrial city of Niterói which stands across the bay from Rio, only one eco-barrier was still intact. According to a local fisherman there are still many factories dumping chemicals into the bay and sewage flowing in which makes fishing more precarious nowadays (Carless, 2017). Consequently, the

city postponed its promised program to clean Rio’s deeply polluted waterways due to its budget crisis after the Olympics (McBride, 2018).

Figure 7.9: Eco-barriers installed in Mertiti River being used to stop trash from entering Guanabara Bay

Source: The Associated Press, 2015

- Rio's water supply network is inefficient, with a leakage rate of around 50% (Frigola, 2018). One of the main goals of Rio to achieve sustainable commitments was to implement a modern sanitation system that would clean up the majority of the sewage in the waterways. The biggest unfinished project in the city is sanitation. According to Frigola (2018) "the forecasted investments and programs of the Inter-American Development Bank and World Bank have only partially materialized, and some neighborhoods and municipalities in Rio’s metropolitan area remain without sewage treatment". In the meantime, Barra has benefited from more upgraded water pipes and sewage treatment facilities (Watts, 2015).

- Although Rio 2016 officials were to undertake 24 million tree plantation in order to compensate carbon emissions, by 2016 that was not fulfilled (Rio 2016, 2009; Boykoff & Mascarenhas, 2016; Gold, & Gold, 2016). A readjusted number of only 8.1 million was announced which was less than one-third of the number outlined in the Rio 2016 bid (Konchinski, 2015; Gold, & Gold, 2016). This seems to be an expected result since no plantation and management plan is known for the entire city of Rio de Janeiro. So, the number of trees to be planted resulted from the figures obtained for carbon emissions compensation without real tools for implementation. In fact, the "Rio 2016 Sustainability Report" issued in 2014 ignored mentioning the tree-planting initiative and by May 2015, environmental officials revealed that merely 5.5 million seedlings had been planted (Organizing Committee 2014 in Boykoff & Mascarenhas, 2016; Konchinski, 2015). Other solutions for better thermal environments were not considered such as designing more water bodies and gardens or by increasing areas of permeable pavements, green walls and roofs (Cai et al., 2017).
- The Olympic Golf Course was located in an Environmental Protected Area (EPA) in Barra da Tijuca region (Figure 7.8). Despite the fact that there were already two Golf Courses within the city, a new course was required for the purpose of the games. A part of the Marapendi EPA was chosen to build the Olympic Golf Course, a biodiversity hotspot home to rare butterflies, pines and other endemic species (Hodges, 2014; Green news, 2016). Rio's city council quickly passed Complementary Law 125 in order to access the Golf Course land parcel in 2012 (Hodges, 2014; Vercillo, 2015). According to this law, the height of neighboring buildings increased from six stories to twenty-two stories (Hodges, 2014). The land chosen for the new Golf Course was criticized as the real purpose of changing the zoning code was to allow a huge real estate business. Environmental specialists criticized development in the Barra zone. For example, Professor Fernando Walcacer, former City Prosecutor for Urbanism and the Environment argued "the World Cup and the Olympics gave the city government the excuse to totally diminish every aspect of responsible urban planning in Rio de Janeiro" (Rioonwatch, 2014). Figure 7.10 shows EPA that was converted into Golf Course.
- Therefore, Olympic Golf Courses have raised concerns about the vulnerability of EPA against unlimited urban expansion. At the same time, the Olympics area is witnessing an increase in real-estate prices with ongoing commercial, residential and hotels

construction which can fuel further building in the environmental protected area. After the Olympics, the Golf Course is shut down and remains unused. Figure 7.11 shows the Olympic Golf Course before and after construction.

Figure 7.10: Rio Olympics Golf Course (black outline)

It was built within an Area of Environmental Protection for the 2016 Olympic Games

Source: https://news.mongabay.com/2016/05/new-rio-olympic-golf-course-harmed-environment-say-critics/

Figure 7.11: Aerial image of Rio Olympics Golf Course

Source: The Washington Post, 2016

Overall, in the context of event-related environmental commitments, as the results of experts´ views validated, the Olympics brought more negative impacts in environmental dimension than positive ones. For example, several important environmental projects such as

cleaning up Guanabara Bay were pointed as Rio 2016 Olympic legacy (Boykoff & Mascarenhas, 2016). Guanabara Bay and Jacarepagua Lagoon System were amongst the most important projects to reduce the pollution, that Brazilian government committed for the 2016 Olympic Games. But Rio was not successful in achieving the Olympics' environmental promised goals. Evidence indicates that cleaning up of Guanabara Bay as well as improving water quality and sewage system has failed as already mentioned by Kaiser (2015). Indeed, many environmental commitments have not been met in Rio de Janeiro contrarily to what was stated in candidacy files. Furthermore, eliminating a part of the EPA in order to build the Olympics Golf Courses mutilated the integrity and continuity along the north margin of the Lagoon of Marapendi. As Gaffney (2013) reported, in Brazil, there is no significant golf culture and the existing courses in Rio de Janeiro are located in the wealthiest areas of the city. Actually, golf in developing countries is a problematic practice in terms of city' land use, being generally in favor of a small minority (Wheeler & Nauright, 2006). Such a top-down process to eliminate part of the protected area was guided by private sector interests.

A large number of Olympic-related urban development projects were implemented in environmentally fragile regions namely Barra de Tijuca and Jacarepaguá (Gaffney, 2013). As Redondo (2015) argued appropriately the 2016 Olympics was an excuse for increasing occupation in free areas, flood-risky grounds and fragile hillsides, which has been driven by new urban ratios to construction of high rise buildings such as hotels, residential and commercial structures as well as fiscal incentives. Likewise, there have been concerns about its vulnerability in the face of urban sustainable development (Maiello & Pasquinelli, 2015). In fact, Rio without its nature would not be an historic urban landscape (Redondo, 2015).

This follows an old urban pattern in Rio as, according to Curi et al. (2011), several questionable interventions in the city’s landscape have taken place under justification of the 2007 Pan American Games. For example, the destruction of the vegetation in the Parque do Flamengo, more precisely in the Marina da Gloria, in order to develop the area, can be highlighted. The development project for the Marina targeted the transformation of public areas into private business zone and in line with real estate interests, as well as building a complex of commercial, recreational and cultural activities.

However, in case of the impacts of Olympic-related transport improvement on future emissions of carbon dioxide reduction, it can be argued that upgrading the subway can be an important contribution to reduce the greenhouse gas emissions in Rio de Janeiro.

7.3.3. Event-related urban management problems

A variety of stakeholders are involved in planning, management, organization and implementation of Olympic-related projects. Planning, organizing and managing a sport mega-event, especially the Olympics, deals with various national and international organizations and requires a particularly coordinated planning among urban planners, public managers and event-related organizations, authorities and different types of stakeholders. In this way, host cities can avoid redundant facilities that are costly to maintain (Smith, 2014). Meanwhile, according to Gaffney (2013) none of the FIFA and IOC has sustainability measures that include long-term urban planning, post-event use of facilities and social equity. From a successful mega-event management perspective, it is essential that post-event planning be included in pre-event planning and management. Therefore, post-event planning needs to be prioritized in the pre-event phase. Event-related urban planning strategies need to be developed and implemented appropriately during the event planning phase through specific action plans as well.

The following are the weaknesses and concerns associated with Olympic-related urban planning and management process:

Changing urban regulations: In Rio de Janeiro, mega-events have helped to innovate new forms of urban planning derived from political and economic interests (Gaffney & Robertson, 2016). In this way, city government promised subsidies to private sector in order to free up real estate for quick profits (Srinivas, 2016). Smith (2014) stated "mega-events are often used as states of exception or Trojan horses to implement new systems". In Rio, the state of exception led to frequent changes of urban regulations and environmental laws by city government. Likewise, in the context of the Olympics, the city government changed zoning laws and residential buildings heights were raised to eighteen floors in Barra da Tijuca region (Sanchez & Essex, 2017). Similarly, the zoning regulation in the Marapendi area was modified and, the heights of buildings were increased from six to twenty-two floors (Gaffney, 2013). The aim of these changes in plot utilization coefficients was in favor of private investors for future development in the Olympic Park and surrounding areas (Gaffney, 2015; Sanchez & Essex, 2017), transforming them into a high-density neighborhood. That is why as Gaffney (2010) stated, event projects in this city are a measure of changing conceptions, patterns, and realities of urban discipline.

Modifying the environmental and urban zoning laws to meet the needs of the Olympics is obviously one of negative points for environmental and urban sustainability. It also shows a weakness in the process of sustainable event planning and management.

Lack of monitoring and control of projects implementation: Monitoring and evaluating is a significant tool of management in the sustainable urban planning practice. Continuous monitoring helps decision-makers to make informed decisions about allocation and distribution of resources, as well as contributes to decision-making transparency. "Process monitoring is used to determine whether and how the program is being delivered as proposed" (Un-Habitat, 2016). Urban planners and decision-makers need to know how to make optimal use of limited resources and create desired and meaningful impacts and outcomes for urban changes (Un-Habitat, 2016). Event-related projects in Rio suffered from a lack in monitoring and evaluation processes. Many developments were carried out without adequate monitoring. Consequently, in 2014 World Cup and also in 2016 Olympic Games, some environmental projects were delayed or unfinished due to lack of appropriate monitoring in the delivery process and lack of licenses, resources and inconsistencies. Therefore, despite the ambitious promises made at the candidature file, commitments were not fulfilled and the costs were not realistically calculated (Ayuso, 2016). In fact, most abandoned Olympic infrastructures such as the Olympic Park, clearly indicates that they do not match the future needs of Rio residents. In addition, the excessive costs for preparing the 2016 Olympics are another barrier in the implementation of post-event plans. Such problems and weaknesses are caused by poor event-related urban planning and management. Hiller (2002) pointed out that planning for the Olympic should be fully carried out in normal urban decision-making processes, through local planners, rather than independent event planners (Essex & Chalkley 2004). Mega-event urban planning and management has to be increasingly agile and responsive to address complex challenges posed by event projects implementation.

Lack of transparency: Olympic-related urban planning has been prepared behind closed doors. Local residents did not play a significant role in the urban planning process and operation of mega-event preparation. There was lack of transparency and a heavily bureaucratic project implementation process which was a problem for redevelopment activities (Sanchez & Broudehoux, 2013). Preparation for the Olympic Games is characterized by lack of accountability and transparency on investments and on the project implementation process. This weak point is another major barrier to the efficient event-

related urban sustainable development and management in Rio de Janeiro (Broudehoux, 2013).The large portion of Olympic investments came from the Federal Government Plan for Growth Acceleration, a national plan that has been broadly criticized because of neglecting environmental and social concerns (Lemos, 2013). All Olympic-related projects have been planned in a top-bottom planning process, without establishing an appropriate monitoring system and, without public participation. Politicians, entrepreneurs and developers assume that "they know what is good for the city" (Schwambach, 2012). It should therefore be noted that the Olympics in Rio de Janeiro did not contribute to social inclusion (Ayuso, 2016).

Prioritizing private sector interest: The Olympic-related urban interventions in Rio were part of a political and economic strategy led by developers and aligned with private sector interests (Sanchez & Essex, 2017). For this reason, the private sector plays an important role in post-event period development and implementation. Therefore, in post-event period, management of sport infrastructures is divided between the municipal government and the private sector.

One of the strategic objectives of the Sustainability Management Plan (SMP) of Rio 2016 Olympics was to organize all-inclusive Games, leaving a social positive balance for all people (Organizing Committee Olympic and Paralympics Games Rio 2016, 2013). It was called "Games for all". But, in reality, the Olympics led to displace low-income population to establish an exclusive neighborhood in the Olympic village. For example, local residents that were evicted from their settlements due to the sport mega-events, have been sent to the periphery. A similar situation occurred with displacement of criminal gangs. This is another weakness of event-related urban planning and management which instead of solving the problems and eradicating them, just drove them away to the urban fringe. This type of urban planning not only led to neighborhood segregation and insecurity intensification, but also developed gated complexes which compromise the creation of urban dynamic environments and create barriers on interaction among local people.

7.4. A comparison of the event-related urban interventions in Barcelona and in Rio de Janeiro

This section is intended to provide an argument to compare sport mega event-related urban interventions in Barcelona (1992) and in Rio de Janeiro (2016). This critical evaluation helps to better understand the importance of the role of event-related urban planning and

management as well as the role of local authorities in the success of creating sustainable urban changes. Nowadays, Barcelona is considered the first city that used the 1992 Olympics as a tool for extensive urban regeneration, in particular, restructuring the port area. In this new (at the time) planning approach of urban transformation, the city´s strategic planning became part of the urban planning agenda.

City authorities such as city council used the Games to make more profound changes in the city that transformed it into a modern city with high quality of life. Barcelona benefited greatly from 1992 Olympics as the Games converted the city into a major tourist destination. They also created a significant architectural legacy which today is a large-scale music venue and, the Olympic stadium which was used for years by a soccer team and hosts sports competitions. In Barcelona, four obsolete areas were selected for extensive regeneration (Garcia-Ramon & Albet, 2000). After the Games, the waterfront area displayed an in-depth transformation while it opened up to public use as well as beaches were accessible to the people.

Calavita and Ferrer (2000) stated that Barcelona transformed itself in a very short time and with lasting benefits, from a gray industrial city into a successful city at the international level. The Games converted the city into a main tourist destination, providing a high-profile opportunity to create a unique urban brand. Barcelona's urban ranking skyrocketed, a main achievement of the Barcelona model according to many authors (Monclus, 2003; Dodds, 2004; Broudehoux, 2007).

As previously mentioned, Rio de Janeiro in planning for Olympics 2016 got inspired by Barcelona. The event-related urban interventions in Rio de Janeiro followed the same ideal of Barcelona urban regeneration. Rio followed Barcelona in form, that is in process, but not in contents. Indeed, in one hand, it was an imperfect follower of what occurred in Barcelona's urban planning. On the other hand, there are differences between the two cities in terms of territorial dimension and geographical location, as well as in terms of population size and characteristics as well as the numbers of annual foreign tourists. Barcelona, with an area of 100 km2 has 1.6 million inhabitants (PECQ, 2011) and Rio de Janeiro with a territorial extension of 1,182 km^2 has more than 6 million inhabitants. Barcelona portrays a privileged location for international visitors and tourists within a top tourism destination country, such as Spain, boasting 50 million external visitors per year. But, Brazil, with all its territorial extension and landscape potential, receives only five million international visits each year (de Oliveira & Gaffney, 2010).

It is known that host cities like London (2012 Olympics) and Rio de Janeiro (2016 Olympics) were both inspired from the Barcelona Olympic model. Although the more recent "London model" of development could be considered for providing another blueprint for Olympics cities (Moore et al., 2018), obvious problems have surfaced there in terms of: i) access for disabled people; ii) accessibility on the western side of the Olympic park; iii) post-usage of sport facilities by the local community (House of Lords, 2013). Therefore, for best practices in Olympic-related urban planning, the "Barcelona model" still makes sense to be selected for cross-comparative analysis. After the 1979 democratic elections, Barcelona established an overall strategy for city restructuring, integrating the marginalized neighborhoods. The strategy aimed at social and territorial equality for all its citizens (Calavita & Ferrer, 2000). The 1992 Olympics played an essential role in its implementation. This approach will be cross compared with the 2016 Rio Olympics.

7.4.1. Differences between the legacy templates

One of the city inhabitants' expectations in hosting the Olympic Games is that the event will help to improve their quality of life. According to a survey conducted about public opinion by the Brazilian Statistics Institute (Ibope), 60% of people thought the event would have a negative impact and would bring no benefits to Rio. Only 32% thought the Games would bring benefits to the city (Economia, 2016). Another survey conducted by Datafolha showed that 63% of Brazilians thought the Rio Olympics would disadvantage Brazil. Only 29% were feeling optimistic about the benefits of the event (Folha de Sao Paulo, 2016).

The following sections portray the differences which can be identified in the Olympic-related urban planning in both cities around the five key criteria selected among the main physical and economic characteristics conducive to territorial equality. These are site selection, eviction problems, public transportation, environmental commitments and event costs.

Four sites selection

In Barcelona, four marginal areas were selected for extensive regeneration. These four Olympic zones and the ring roads that would facilitate their connections were part of Barcelona’s plans (New Center Areas Plan and General Metropolitan Plan) regardless of

wining the bid (Joaquin, 2012). In contrast, the four zones in Rio de Janeiro were selected to develop Olympic facilities. This choice indicates a missed opportunity to redefine a unique city where urban cohesion has always been neglected (Henley, 2016). According to Sanchez and Essex (2017), the design of the Rio Olympic park features a rigid separation between residential areas, venues, recreational areas and green spaces. This does not foster a sustainable mixed-use neighborhood and is completely different from the flexible planning approach Barcelona used to stimulate mixed functional land uses and further transformation of surrounding areas.

In Barcelona, the majority of the Olympics projects were planned between 1960 and 1980 and their implementation provided waterfront access to locals while opening the city to the sea, setting a modern image over the old industrial one. In fact, after the Games, the waterfront area was opened to public use and beaches made accessible to the people. On the opposite, Rio´s Olympic Village was planned as a gated access complex based on private motor vehicles. The only exception lies in Deodoro zone where a 92,000 square meters green space (Madureira Park) was built. It is among the few Olympic facilities which generated enthusiasm in local residents due to the previous lack of greens in this zone.

Eviction problems

Barcelona´s Poblenou neighborhood, a derelict industrial and working-class district, was transformed into an Olympic Village in the coastline apparently without evicting its local inhabitants. In Rio, there were favela evictions (Healy, 2016). At least 11,000 families were affected by forced removals directly or indirectly linked to the Olympics. Moreover, 600 families were removed from Vila Autódromo, adjacent to the Olympic Park as well as 771 families from another favela, Vila das Torres in Deodoro, to make way to build the green space (Watts & Douglas, 2016). Many residents were displaced due to Olympic-related public transport projects.

In Barcelona, announcements were fulfilled that, after the event, houses would be put onto the housing market at low or moderate prices (Garcia-Ramon & Albet, 2000). Consequently, along with income equality improvement over the period 1985-1995, Barcelona neighborhoods became more equal in terms of access to good quality housing (Calavita & Ferrer, 2000; Pitts & Liao, 2009). On the contrary, Rio Olympic related housing projects were designed as closed-condominium for middle and upper-middle classes.

Moreover, there were no affordable housing provisions for Vila Autódromo residents or others who were displaced by the Olympics.

Public Transportation

In Barcelona, there was a focus on rationalized public transportation development to serve the four Olympics sites integrated in the overall city transportation network. One of the biggest challenges in the management of the Olympic Games in the city of Rio de Janeiro was mobility, which should be offered to the thousands of tourists during the competition. Such transport should integrate, with knowledge, the aforementioned regions, as well as the airports, harbors and highways that serve the city (Uvinha, 2016). Rio undoubtedly benefited from some new Olympic-related urban transport projects; however, public transportation projects such as the extension of the subway and rapid transit bus lines were excluded. Subway line 4 prioritized access to the event sites and wealthy neighborhoods and neglected the rest of the city's transit needs. In fact, the transport expansion was mainly implemented in Barra da Tijuca, a wealthy area of the city. Most of the transportation projects got delayed and their budgets increased from 7% to 122% (Plautz, 2014). Gaffney (2010) pointed out that urgent changes in urban infrastructures were a necessity. But it remains unclear whether or not Rio’s mega-event projects are consistent with long-term city development plans.

Environmental commitments

Barcelona local authorities planned the implementation of an environmental regeneration along the entire city during the preparatory years for the Olympics. According to Perez (2017) there was an environmental vision and it was planned following international guidelines for a more efficient management of industries, energy and wastes, more rationalized public transport system and the creation of new parks and green areas as put forward in the "Green Book on Urban Environment". Barcelona´s strategy was based on four main environmental commitments: the shoreline transformation, the renewal of the sewer system, the reduction of air pollution and the development of green areas.

Rio de Janeiro pledged to host the "Green Games for a Blue Planet" having sustainability as central tenet. Despite the city's ambitious environmental goals, it failed in achieving its goal for a greener Olympics. In fact, many environmental commitments have not been met. Cleaning up projects such as Guanabara Bay and Jacarepagua Lagoon System were delayed or even unfinished. Despite improvements, as much as 60 percent of sewage and waste went

untreated (Waldron, 2016). Rio did not succeed in planting over 24 million seedlings to deal with the negative effects of carbon footprint; only 5.5 million trees were planted. In addition, the partial allocation of Environmental Protected Areas to build the Olympic Golf Course raised concerns about jeopardizing their vulnerability.

Event costs

The Olympic costs and the share of public and private sectors' investment in the two cities were different. With regard to financial strategy, Barcelona adopted a different approach from previous games. For example, 83 percent of the total budget was connected to non-sports facilities and general urban development (Gold, & Gold, 2008). This amazing figure of less than 20 percent of investment spent on sports facilities is due to the fact that among the thirty-seven venues used during the Games, twenty-seven already existed and five more were already under construction. Likewise, 60 percent of the financial resources for the Games were funded through the private sector and only 5 percent funded by the city of Barcelona (Zimbalist, 2016). Public-Private Partnerships provided investment in strategic projects.

In Rio de Janeiro, the costs increased much more than what was predicted. According to the new data released by local government, costs of hosting the Olympics in Rio were, at least, $13.1 billion that were paid for with a mix of public and private money (Watson, 2017). A considerable amount of this money was scheduled to improve the urban transportation system. Construction of Line 4 in South area- Barra da Tijuca was alone 3.11 U$ Billion (Pereira, 2018). Nearly 12.5 U$ Billion (25 billion reais) were spent on projects involving transport development, urban development projects and environmental cleanup (Watson, 2017). For example, the Olympic Village was a state-sponsored project in which the private consortium received about 1.17 U$ Billion (R$2.33 billion) in public financing (Gaffney, 2015). Nevertheless, it was not possible to meet required deadlines due to the misallocation of financial resources. Development of the four Olympic zones and other facilities, which were connected by new highways and rail lines, came in far over budget. With a state auditor finding the city’s $3 billion subway extension was overbilled by at least 25 percent (McBride, 2018).

Brazil spent $12 billion on infrastructure development from 2009 to 2016, but tourism income from the events is only expected to be $400 million adding less than 0.02% to GDP (Best, 2016). This confirms other authors' opinions (Brannon, 2015) as well as alerts on World Cup and the Olympics having a negative impact on Brazil’s financial position (Engerman, 2012).

As mentioned before, many event-related projects remain incomplete or have even been abandoned (Watson, 2017). Due to the billions that were wasted, the venues quickly became white elephants. As Drehs & Lajolo (2017) stated that "the maintenance alone will cost the government approximately $14 million this year".

7.4.2. Key criteria for Olympics-related interventions in Barcelona and in Rio

The five key criteria (selected and described in the previous section) for territorial equality in urban interventions were assembled in Table 7.6 that shows a summary of the evaluation of the Olympics-related urban interventions in Barcelona and Rio de Janeiro. This cross-comparison evidences more clearly the problems with 2016 Olympics for its host city.

Table 7.6: Key Criteria of Olympic-related urban interventions in Barcelona and Rio

Key Criteria	Barcelona	Rio de Janeiro
Sites Selection	- Most event-led regeneration occurred in the deteriorated port area - Olympic-related planning helped to integrate the marginalized areas - Mixed-use neighborhoods development - Broad path for pedestrians, dynamic urban environments and attractive places for tourism - No abandoned Olympic facilities	- Most event-related projects were in the wealthy area of Barra da Tijuca - Olympic Village was designed for post-Games usage as a luxury complex - Closed urban spaces and rigid separation between residential areas, venues and recreational areas - Car dependent event-related urban intervention - Many Olympic venues were abandoned after the Games
Public Transportation	- Construction of an Olympic related new ring road - Integration of public transportation network	- Access to public transport by low-income neighborhoods remained weak - Prioritized access to the event sites and wealthy neighborhoods -The city's transit needs were neglected
Eviction Problems	- None were reported	- Eviction of a low-income community in order to implement Olympic projects
Environmental Commitments	- Olympic-related environmental activities were divided into three phases: sustainable policies, sustainable design and environmental recovery actions - Public transportation development -Creation of new parks and green areas	- Missed opportunity in offsetting carbon emissions goals created by the Games - Failure in promised target for cleaning up the contaminated waterways - Construction of Olympic Golf Course in an Environmental Protected Area

	- Environmental protection integrated into the organization of the Olympics through sustainable management	
Event Costs	- The Olympic village was developed by the private sector -Less than 20 percent of total Olympic budget was spent on constructing new venues - Availability of resources from the European Development Funds	- The Olympic Village was built through a Public-Private Partnership - Pre-existing sport facilities and venues underwent costly renovation - Almost exclusive participation of public resources in the investment - Private appropriation of the benefits

Source: Own work, 2018

7.5. Synthesis

In this chapter, the discussion about sport mega events´ impacts was divided in three sections. The first discussed the degree of urban sustainability transformation through comparative analyses between sport mega-event impact indicators and sustainability sub-themes in the city of Rio de Janeiro. The relationship between impact indicators and sustainability sub-themes revealed that event-related transport improvement and green spaces development was slightly aligned with sustainable development. However, Rio de Janeiro has not met sustainable objectives in terms of diminishing the hosting events influence on: i) urban environment such as offsetting carbon emissions; ii) economic growth; iii) social improvement such as reduction of urban poverty; iv) physical development. In terms of economic growth, it seems that the Olympics not only did not contribute to the city's economic growth, but the city faced a financial crisis which was partly due to the economic downturn in Brazil and partly due to the massive costs of hosting the Games.

The second section evaluated event-related urban planning in four Olympic areas. It clearly revealed that the Olympics caused some improvement especially in transport upgrading and urban interventions but the main part of the event's projects developed in the south and west regions, in particular in Barra da Tijuca which is a wealthy area. This chosen location indicates a lack of consideration of balanced distribution of event-related investment

and ignorance of post-event usage. Moreover, building large-scale sport infrastructures requires massive additional investment in infrastructures to be used in post-event period, which is the one of the city's challenges. Two years after the Games, plans for the post-Games usage of Olympic-related sport infrastructures were not implemented. The Olympic Park and other venues are largely abandoned and, in some cases, they have been vandalized. This section also addressed the weaknesses of event-related urban planning and management as well as the monitoring system, which may have originated in decision-making processes and political structures at the city or country levels. Due to limited funding, implementation of some event projects such as environmental projects, which were part of Olympics´ environmental commitments have been delayed.

The third section of this chapter addressed a critical comparison between Olympic-related urban interventions in Rio de Janeiro and Barcelona. Essentially, there are differences between cities in terms of territorial dimension and geographical location as well as on the way of approaching urban interventions.

The fact is that Rio was an imperfect follower of what occurred in Barcelona's urban planning. In Rio, Olympics preparation raised criticisms about event management especially in the expenditures due to lavish spending on projects, delays and unfinished projects. In terms of the main physical and economic characteristics conducive to territorial equality discussed in this paper, all of them performed rather poorly in Rio.

Analyzing in detail the five key criteria for territorial equality, the following conclusions can be put forward. In terms of site selection, while Barcelona chose a problematic area to upgrade, Rio selected sites near wealthy areas and went ahead with serious eviction problems which have not been reported in Barcelona. Also, the public transportation in Rio prioritized the Olympic sites catering for middle and upper middle class residents while Barcelona developed public transportation integrated in the entire city.

The 1992 Barcelona Olympics achieved milestones in sustainable management hence the Games proved that environmental protection can be perfectly integrated within the organization of sport mega-events. Rio was not successful in its environmental commitments that could not be met in time for the Olympics. Also, the event costs were highly dependent on public resources while the private sector appropriated most of the benefits.

The learning lessons on exploring sport mega-event impacts in Rio are presented in the conclusions.

Chapter 8 : Conclusions and recommendations

8.1. Conclusions

This thesis has contributed to research the role of sport mega-events in sustainable urban transformation. In response to the objectives of this research, the final conclusions and recommendations for sustainable event-led urban development are drawn and presented in this chapter.

As set out in the literature review chapter, holding mega-events in developing countries without sound event management linked to urban planning will intensify huge problems such as abandoned or rarely used sport facilities, carbon dioxide emissions due to long-distance tourism flows, massive costs of sport infrastructures, forced eviction of local inhabitants, increased poverty and damage to host city image. These problems were already being faced by host cities before hosting the mega events in several physical, environmental, economic and social-cultural dimensions. The literature on the challenges to compete for hosting a sport mega-event evidences that a higher risk is associated with host cities in developing countries compared to that of the developed countries.

This thesis developed a sustainable sport mega-event model of hosting an event through presenting an ideal complete process of integrating city planning with event process management. Following such iterative and bottom-up approach seems to be a safer guarantee of success of the event with positive achievements and more public satisfaction. Accordingly, application of this model may help to achieve the goals for more positive impacts and sustainable urban improvements for the host cities in developing countries.

The proposed sustainable sport mega-event model is assembled through the reviewing of sport mega-events' impacts on host cities located in developing countries. Lack of alignment between the goals and the city's development plans produces a vicious cycle in bidding, management, organization and implementation process. This vicious cycle can lead to undesirable results on the urban redevelopment and most likely it can be repeated in future events. This seems to be a major conundrum.

In this thesis, in order to gain a deeper understanding of the role of hosting the mega-events in urban transformation, an in-depth investigation on a case study from physical and environmental dimensions is undertaken, including conducting a survey of experts' opinion on sport mega-events' sustainability impact intensity in Rio de Janeiro and, examining the

impacts of Olympic projects implementation in selected zones. Major findings of the case study can be summarized in the following points:

- The experts' survey from Rio de Janeiro indicates the same results that developing countries displayed in the literature review. It clearly shows in statistical quantitative analysis, negative perceptions in all dimensions. Overall, experts' survey results display the existing deficiencies in event planning, preparation and implementation process in Rio de Janeiro. All these three processes should have played an essential role in promoting the city development to confront the challenges that may have to be faced in the future. A better understanding of the mega-event impacts can help future candidacies plan to achieve long-term sustainable urban development goals.

  As this city faces problems such as public deficits, need of massive infrastructure investment, widespread social and economic inequality, the Olympics budget was inadequate to allow heavy investments in order to provide necessary development requirements for long lasting solutions in core issues. Hosting events in Rio did not compress urban projects implementation from thirty to seven years, as it has been reported in other cities. In Rio, the experts' opinions pointed out that the huge expenditures on large-scale projects and sport infrastructures that are so different from daily requirements do not meet the needs of the majority of the inhabitants. This overall conclusion can be seen in most developing countries that held sport mega-events.
- The views of the experts on environmental issues were the most severe and strayed far aside the critical value. This thesis also considered environmental issues related to event preparation. Some projects were delayed or even unfinished as they were not able to meet required deadlines due to the misallocation of financial resources. Guanabara Bay and Jacarepagua Lagoon System were among the most important projects to reduce the pollution, a commitment undertaken by Brazilian government for the 2016 Olympic Games. But the city was not successful in cleaning up of Guanabara Bay as well as improving water quality. Furthermore, eliminating a part of the EPA in order to construct the Olympic golf courses mutilated EPA integrity and continuity along the north margin of the Lagoon of Marapendi. Rio's sport mega-event management in terms of environmental commitments revealed insufficient albeit massive event expenditures, setting of ambitious goals and plans with unrealistic expectations and lack of accountability and transparency of investments

via city authorities. This led to failure in the implementation of environmental promises and the experts' views significantly express this mismatch. While, as Essex and Chalkley (2004) suggested a host city should have carefully integrated plans and set realistic strategies for all aspects of event-related development.

- The thesis investigated the sustainability of event-related urban interventions in Rio de Janeiro. The relationship between impact indicators and sustainability sub-themes revealed the city has not met sustainable development objectives in terms of diminishing the hosting events' influence on: i) urban environmental such as offsetting carbon emissions; ii) economic growth; iii) social improvement like the reduction of urban poverty; iv) physical development. Indeed, there are significant gaps between the established physical, environmental, economic and social-cultural goals of hosting the Games and likely urban sustainability.
- Examination of event-related urban planning in four Olympic areas clearly revealed that the Olympics were leveraged to improve transportation infrastructure. But, focusing of this transportation expansion on south and west regions (in Barra da Tijuca area) and especially in the extension of subway line 4 have received significant criticism, specifically the huge allocation of around 54% of total transportation expenditures. A more recent study by Pereira (2018), on accessibility of Olympic facilities via new transportation projects has shown that Rio's areas have less access (by public transport and walking) to all Olympic sports facilities excluding venues that are located closed to city center. Despite the fact that the city suffers from poor transport facilities, the new transport infrastructure does not consider the wider transport requirements of the entire city. The event-related transport investments have not been able to reduce the accessibility gap between rich and poor areas (historical spatial segregation) to sport infrastructure (Pereira, 2018). Whereas, the wealthiest areas still benefited more from the new transport facilities, poor neighborhoods have not directly benefited from the event-related transport investments. In fact, new transport development has brought less improvement to the city, especially to the poor peripheral urban neighborhoods (Pereira, 2018). Hence, transportation planning should be based on accessibility to all urban areas, rather than merely to meet the needs of the event.
- A mixed-use land use planning model is mainly targeted at reducing the use of vehicles and diminishing pollution, increasing safe and secure accessibility to urban spaces, increasing social interaction, thus contributing to the creation of a dynamic

urban environment. From the perspective of event-related urban planning, urban interventions in Rio with designing gated, closed and controlled residential area and even other urban spaces presenting the modernist city planning model, have been much criticized, due to lack of a dynamic urban environment. According to the plan for the post-event phase, sixty percent of the Olympic Park area is planned as closed condominium. This is incompatible with a dynamic and mixed-use neighborhood planning which was anticipated in the bid. In fact, the Olympic venues were designed with rigid segregation between residential areas, venues, recreational areas and other urban spaces. Both, Olympic park and Olympic Village development focuses on cars instead of pedestrians and on individualism instead of community (Gaffney, 2015; Sanchez & Essex, 2017). Accordingly, access to closed-condominium is provided by private vehicles which follow the same urban planning pattern in the western area of the city. This type of urban planning strategy may neglect urban areas integration.

- From the Olympic zones' chosen location perspective, there is an imbalance in the distribution of event-related facilities. While the city suffers from poor physical and social integrity and unequal urban infrastructure distribution, the city government has argued in favor of public spending on large-scale sport infrastructure saying that these events will benefit everyone. But, the main part of the event projects developed in wealthy areas in Barra da Tijuca (Gaffney & Robertson, 2016). Even though, some Olympic projects were implemented in the Deodoro zone, which is far from the city center and an isolated neighborhood. This made possible some physical improvements such as green spaces and access to public transport facility (Neto et al., 2018). These can be considered positive impacts of the Games for the community which suffers from a lack of urban infrastructure. Nevertheless, no real dynamic of urban sustainable transformation has been established in this area. There is also little alignment between this neighborhood's needs and specific sport facilities that are generally more related to military sport (Schwambach, 2012), and this low-income area could not benefit from Olympic investment projects. Consequently, this unequal development may emphasize territorial inequalities, in this historically divided city.
- One of the most common problems associated with Olympic projects is the post-usage of large-scale sport infrastructures, especially in developing countries. In Rio de Janeiro, the world-class sport facilities requiring massive additional investment to

make them usable in the post-event phase are, currently, the critical challenge faced by city government and event management. After the Games, Olympic Park and other venues are largely abandoned and in some cases they have been vandalized. The city government has attempted to invite private companies to bid for the maintenance and run the park, but due to conflicts between the municipal government and private organizations in management of those venues, the efforts have not yet succeed. Therefore, the future of Rio's second-largest Olympic zone is still uncertain.

- The implementation of some event projects such as environmental projects which were part of Olympics sustainability commitments have been delayed due to limited funding. The event planning and management in Rio de Janeiro seems to have not succeeded in decreasing urban inequality and creating urban integration in the physical and social dimensions. Overall, the weaknesses and concerns in Olympic-related urban planning and management process include modifying current urban regulations, defects in monitoring and control of projects implementation, prioritizing private sector interest, lack of transparency. From a successful mega-event management perspective, it is essential that post-event planning needs are prioritized in the pre-event phase. Event-related urban planning strategies need to be developed and implemented appropriately during the event planning phase through specific action plans as well. The success of a mega-event depends on support from local government, local residents and the Public-Private Partnerships as well as integrated and sustained management with high levels of coordination.

In general, the main aim of this thesis was to investigate the issue, whether Rio de Janeiro has succeeded in transforming the city in a sustainable way through hosting sport mega-events. With three fold evaluation including expert's views survey, sustainability assessment through impact indicators and also the existing evidence, in particular the short-term impacts after the Games, by investigating the Olympic zones planning, the viewpoint that the city was not successful, seems validated. This is particularly true in terms of achieving sustainable urban development, through implementation of new transportation investment and comprising environmental commitments.

Overall, this study, by highlighting some weaknesses in sport mega-event management system in Rio de Janeiro, suggests how a sustainable event urban planning and management system can play an important role in urban sustainable transformation. It seems important to notice that in the absence of sustainable long-term urban development goals for the city as a

whole and a strategic plan to host a sport mega-event, there is also no place for the sustainable development strategy of the city. Since, according to the expert's opinions, events did not bring positive impacts to the city in terms of social and economic aspects.

8.2. Recommendations for further research and practice

Perhaps, one of the most important lessons to be learned from Rio de Janeiro experiences in hosting the mega-events is that less-transparent and less-democratic management systems can mask the interests of certain groups. Therefore, management system in cities of the developing countries often does not provide such circumstances, as to allow people to have the chance to benefit from event-related development. In this way, effective governance of hosting sport mega-events is a necessity to drive sustainable development. Indeed, it presents how establishing good governance and management can play an important role in the success of holding a sport mega-event. Further research is needed on the mitigation of the sport mega-event impacts and on the resilience of the urban areas and systems (transportation, basic infrastructures and social core), as well as to integrate the life cycle of sport infrastructures on the bid process and, lastly, cost-benefit analysis incorporating all dimensions such as physical, environmental, economic and social-cultural to better support and justify the analysis of the actual impacts of such events.

Likewise, host cities can employ an equitable development strategy for urban planning ensuring all residents have equal opportunity not only to benefit from event-led development but also to be compatible with a sustainable future development of the city.

Recommendations for future practice of hosting sport mega-events are provided at the following:

- The integrated sports facilities with city functions such as residential, commercial, recreational, cultural and other functions, through transport networks will guarantee the appropriate and optimum use of those facilities by local residents in post-event period. Also, planning of the event-related projects especially Olympic Village should not be considered as an isolated area, but, it needs to integrate with long-term strategic urban plans;
- Alignment plan for post-event usage of sport facilities should include mixed land use planning and be coordinated with the interests of local residents and sustainable

development of host city as well. In this regard, planning for transforming sport facilities to other required functions in order to efficient post-usage, needs to be more sustainable, more flexible, adaptable and multifunctional as well as feasible (easily assemble structural components). It also needs detailed implementation plans. Additionally, in case of small countries such as Qatar, relocating the sport infrastructures to neighboring countries after the games can mitigate maintenance costs and avoid under used facilities (Sofotasiou et al., 2015);

- Breaking the top-down event-related management process through adopting a sustainable sport mega-event model which shows an ideal complete process of incorporating urban planning as well as event management and organizing process;
- In bidding to host, each city should assess its own context not model it from other cities;
- From sport infrastructural and event-related projects perspective, smaller events offer a more feasible opportunity for event-related intervention (Coates, 2012), and, may have more positive impacts on host city. By small events it is meant trade fairs, conventions and festivals that are also mass communication and promotion tools to enhance host cities' competiveness;
- The long-term usage of every single event-related infrastructure should become an integral part of the bidding document for an independent evaluation of its feasibility in the post-event utilization, without bearing the additional investment costs;
- There is a need to shift from ambitious to realistic objectives and, from ambiguous budgets to transparent costs. In this regard, the events should not be considered as a solution for a host city's basic and structural problems;
- A central role should be taken into consideration for urban planners, in the bidding planning process, to provide actual local development;
- Cities should also pressure Olympic organizations to make supportive changes in their selection requirements (Kassens-Noor & Lauermann, 2017).

Perhaps, one of the most plausible scenarios for reusing the large-scale and expensive sport infrastructure is selecting one or two permanent host cities (McBride, 2018). This choice and option seems to be an appropriate solution. This thesis highlights several issues related to these concerns, but there is still need for further research in terms of physical and environmental impacts of sport mega-events on host cities.

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Appendix

Table A.1: Sustainable Cities International's indicator list

Sector	Indicator	Measures
Economy	Unemployment rates/ Jobs	Underemployment/employment/ unemployment rates; Percentage of green jobs in the local economy; Average professional education years of labour force
	Economic growth	Annual GDP growth rate; Annual GNP growth rate; Net Export Growth rates (% increase of country's total exports minus the value of its total imports per annum; Foreign Direct Investments (Capital/ Earnings accrued from listed FDI's per annum
Environment	Green spaces	Percentage of preserved areas/ reservoirs/ waterways/parks in relation to total land area; Percentage of trees in the city in relation to city area and/or population size
	Reduce greenhouse gases/ Energy efficiency	Total amount of GHG emissions per city and per capita; Percentage of total energy consumed in the city that comes from renewable sources
	Mobility	Transportation mode split (Percentage of each mode of transportation, i.e. private, public, bicycles, pedestrians); Average commute time and cost
	Water quality/ Availability	Total amount of water availability; Water quality index/score; Proportion of population with access to adequate and safe drinking water
	Air quality	Levels of Particulate Matter (PM10 – mg/ m3); Levels of Particulate Matter (PM2.5 – mg/m3)
	Waste/ Reuse/ Recycle	Recycling rate (Percentage diverted from waste stream); Volume of solid waste generated
Social	Complete neighbourhood/ Compact city	Access to local/ neighbourhood services within a short distance; Crime rates; Measures of income distribution and inequality
	Housing	Percentage of social/ affordable/ priority housing; Breakdown of housing sector by property type (owner occupied/ rental,

		single occupant/couples/family/multifamily etc.)
	Quality public space	Percentage of roadways in good condition; Percentage of green space (public parks) coverage in relation to city area and/or population size
	Education	Number of schools with environmental education programs; Adult literacy rate
	Sanitation	Percentage of population with access to water-borne or alternative (and effective) sanitary sewage infrastructure
	Health	Mortality rate/ Life expectancy; Percentage of population with access to health care services

Source: European Commission, 2015/ http://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf

Table A.2 International Urban Sustainability Indicators List (IUSIL)

	Category	Indicator
Environmental	Geographically balanced settlement	Population growth Planned settlements
	Freshwater	Proportion of total water resources used Water use intensity by economic activity
	Wastewater	Presence of faecal coliforms in freshwater Biochemical oxygen demand in water bodies Percentage of city population served by wastewater collection Percentage of wastewater receiving no/primary/secondary/tertiary treatment
	Quality of ambient air and atmosphere	Number of times the limit values for selected air pollutants are exceeded Existence and level of implementation of air quality management plan Emissions of greenhouse gases Consumption of ozone depleting substances
	Noise pollution	Share of population exposed to long-term high level of environmental noise Noise levels in selected areas Existence and level of implementation of a noise action plan
	Sustainable land use	Artificial surfaces as a percentage of the total municipal area. Extent of derelict and contaminated land Number of inhabitants per Km2 Quota of new edification taking place on virgin area and quota taking place on derelict and contaminated land in % per year.

		Restoration of urban land a)Renovation, conversion of derelict buildings b) Redevelopment of derelict land for new urban uses c) Cleansing of contaminated land
		Protected areas as a percentage of total municipal area Land affected by desertification
	Waste generation and management	Area under organic farming Proportion of land area covered by forests Percentage of city population with regular solid waste collection Percentage of solid waste disposed to sanitary landfill/incinerated and burned openly/disposed to open dump/recycled/other Total solid waste generation per capita Generation of hazardous waste
	Effective and environmentally sound transportation systems	Waste treatment and disposal Management of radioactive waste Travel time Transport modes Energy intensity of transport
	Mechanisms to prepare and implement environmental plans	Local environmental plans Latest approval date of Master Plan
	Biodiversity	Proportion of terrestrial area protected Management effectiveness of protected areas Area of selected key ecosystems Fragmentation of habitats Change in threat status of species Abundance of selected key species Abundance of invasive alien species
Economic		Economic
	Consumption and production patterns	Material consumption Material intensity of the economy Domestic material consumption Annual energy consumption, total and by main user category Share of renewable energy sources in total energy use Intensity of energy use, total and by economic activity
	Economic development	Macroeconomic performance a) Gross domestic product (GDP) per capita b) Gross saving c) Investment share in GDP d) Adjusted net savings as percentage of gross national income (GNI) e) Inflation rate Employment a) Employment-population ratio b) Vulnerable employment c) Labor productivity and unit labor costs d) Share of women in wage employment in the non-agricultural sector Information and communication technologies

		a) Internet users per 100 population b) Fixed telephone lines per 100 population c) Mobile cellular telephone subscribers per 100 population
		Research and development a) Gross domestic expenditure on Research and Development as a percent of GDP
		Tourism a) Tourism contribution to GDP
	Finance	Debt service ratio Tax collected as percentage of tax billed Own-source revenue as a percent of total revenues Capital spending as percentage of total expenditures
	Water	Price of water Domestic water consumption per capita
		Strengthen small and microenterprises Ec5-1 Informal employment
Social		Social
	Energy Access	Percentage of city population with authorized electrical service Total electrical use per capita Number and duration of electrical interruptions per year per customer
	Water Access	Percentage of city population with potable water supply service Number of interruptions in water service
	Education	Percentage of children completing primary and secondary education Percentage of school aged children enrolled in schools (by gender) Student/teacher ratio
		Mortality a) Under-five b) Mortality rate c) Life expectancy at birth d) Healthy life expectancy at birth
		Health care delivery a) Percent of population with access to primary health care facilities b) Contraceptive prevalence rate c) Immunization against infectious childhood diseases
		Nutritional status a) Nutritional status of children
		Health status and risks a) Morbidity of major diseases such as HIV/AIDS, malaria, tuberculosis b) Prevalence of tobacco use
	Safety	c) Suicide rate Number of homicides per 100,000 population Number of sworn police officers per 100,000

		population
	Fire & Emergency Response	Violent crime rate per 100,000 population Number of firefighters per 100,000 population Number of fire related deaths per 100,000 population
	Poverty	Response time for fire department from initial call Income poverty a) Proportion of population living below national poverty line b) Proportion of population below $1 a day Income inequality
	Transportation	a) Ratio of share in national income of highest to lowest quintile Km of transportation system per 100,000 population Annual number of public transit trips per capita Commercial Air Connectivity Average travel speed on primary thoroughfares during peak hours Transportation fatalities per 100,000 population So8-6 Number of daily trips and time taken per capita by type of trip and by mode of transport Total average daily distance covered per capita by type of trip and by mode of transport Mode of transportation used by children to travel between home and school
	Natural hazards	Percentage of population living in hazard prone areas
	Adequate housing	Human and economic loss due to natural disasters Disaster prevention and mitigation instruments Durable structures
	Shelter	Overcrowding Right to adequate housing Housing price and rent-to-income
	Security of tenure	Percentage of city population living in slums Area size of informal settlements as a percent of city area and population Secure tenure
	Access to credit Access to land	Authorized housing Evictions Housing finance Land price -to-income
	Culture	Promote social integration and support disadvantaged groups Poor households Number of cultural establishments per 100,000 population City expenditures on culture as a percentage of overall city budget
	Recreation	Square meters of public recreation facility space per capita

Governance	Availability of local public green areas and local services	City expenditures on public recreation as a percentage of overall city budget Citizens' access to nearby public green areas and basic services
	Participation and civic engagement	Citizens participation Voters participation Civic associations
	Transparent, accountable and efficient governance	Transparency and accountability
	Government	Corruption Percentage of population having paid bribes
	Sustainable management of the authorities and businesses	Share of public and private organizations adopting and using environmental and social management procedures

Source: Shen et al., 2011

Table A.3: intensity of the impacts of 2016 Olympic Games in Rio de Janeiro (English version survey questionnaire applied)

Type of impact	**Factors**	**Intensity of impact**				
		Very weak	Weak	Moderate	Strong	Very strong
Economic	Promotion of host city's economy					
	Providing host city residents with long term employment opportunities					
	Wealth generation for the host city					
	Increase opportunities of relevant business to the host city					
	Increase of small businesses in host city					
	Attraction of more investment in infrastructure and new facilities to host city					
	Increase country's openness and liberalization trade					
	Visitor expenditures boosting host city trade					
	Growth in tourism in the long-term to the host city					
	Promote investment opportunities to urban revitalization					
	Improper use of funds and misappropriation of public investments					
	Elimination or postpone of investment health and education due to staging the Games.					
	Massive and unnecessary investment in constructing new infrastructure, roads, regional railways, new urban subway lines and airport					
	Spending money in lavish sports facilities that have little use after the Games					
	Avoidance by non-sport tourists to travel in the Games period					
	Growth of security costs					
	Increase the property and real estate prices in the surroundings of Olympic area					
	Increase of tax rates for host city residents					
	Increase on the prices of goods and services					

Social-Cultural	Increase in public participation in decision-making and urban regeneration					
	The volunteering program impacts on people's education and income					
	Increased involvement of host city residents because of more possibility to use sport facilities					
	Promoting public health					
	Increase community confidence and awareness					
	Increase excitement and bringing the host community together and closer					
	Increase social welfare from investments in public facilities and infrastructure					
	Increase the feel-good effects and creation of local identity and sense of place in residents of host city					
	Increase in providing the event-related social activities to the host city					
	Increase better understanding of other cultures and societies					
	Increase the chance for residents to meet new people and cultural exchange between tourists and residents					
	Reduce crime through more accessibility and safer environment of sport facilities					
	Reduce serious crime and anti-social behavior rates as a result of investments in security					
	Put the host city on the map, increase international reputation and exposure					
	Pride boost due to improved host city's image worldwide					
	Increase in multi-cultural destination promotion of the host city					
	Decrease poverty in host city					
	Decrease and disruption of residents' quality of life during the games					
	Push away poor people who gather or live in Olympic area and gentrification promotion due to new development (replacement of working class by middle class)					
	Disruption in the social fabric due to gentrification					
	Increase vandalism in host city					
	Increase distrust between host city 's authorities and citizens due to lack of transparency					
Physical	Increase of regeneration and redevelopment of host city before the event					
	Increase the opportunity for regeneration of deprived and abandon districts of the host city					
	Renovation of urban equipment's					
	Reducing urban redevelopment process from few decades to less than 10 years					
	Providing an incentive for the restoration of historical places					
	Increase the built heritage protection actions in host city					
	Development of tourism capability in hotel industry					
	Improving urban public and green space quality					
	Improvement of public facilities					

	Stimulus to improve transportation in the host city					
	Increase in integration of urban transport system					
	Upgrading road and rail networks and airport infrastructure					
	Insufficiency of physical facilities such as parking spaces					
	Growth in public transport and airport traffic					
	Stadia built can provide landmark for host city					
	Improvement of infrastructure in surroundings of the Olympic area					
	Urban areas degradation due to non-use of the new sports infrastructure after finishing the Games					
	Heavy construction of public facilities that are not essential or too luxurious					
	Urban and physical damage due to the lack of or weakness of planning and control					
	Overcrowding of local facilities and sport facilities during the Games					
Environmental	Developing green transport					
	Opportunity to improve air and water quality, waste disposal and clean energy development in host city					
	Developing greener environment					
	Increase the awareness with natural environment					
	Creation of new principles of environmental protection and renewable energy sources					
	Increase traffic congestions					
	Increase air pollution due to public transport and air traffic					
	Increase noise pollution					
	High consumption of water , energy and non-recyclable waste					
	Carbon footprint and increase in CO2 and greenhouse gases emissions due to major influx of visitors					
	Pollution caused by demolishing temporary Olympic Game structures					
	Environmental damage due to absence of applying to evaluate and monitoring of environmental impacts of programs, plans and policies					

Tables A.4-7: Survey questionnaire applied to Rio's 2016 Olympic Games (Portuguese version)

Inquérito A.4: intensidade dos impactos da realização dos Jogos Olímpicos no Rio de Janeiro

Tipo de impacto	**Designação do impacto**	**Intensidade de impacto**				
		Muito Fraco	Fraco	Moderado	Forte	Muito Forte
Econômico	Promovendo a economia da cidade anfitriã					
	Promovendo oportunidades de emprego a longo prazo a moradores da cidade anfitriã					
	Gerando riqueza para a cidade anfitriã					
	Aumentando as oportunidades de negócio relevantes para a cidade anfitriã					
	Aumentando o número de pequenas empresas na cidade anfitriã					

	Atraindo mais investimentos em infra-estrutura e novas instalações para cidade anfitriã					
	Aumentando a abertura do país anfitrião e a liberalização do comércio					
	Consumo dos visitantes impulsionando o comércio da cidade anfitriã					
	Crescimento do turismo a longo prazo para a cidade anfitriã					
	Promovendo oportunidades de investimento para a revitalização urbana					
	Uso impróprio de fundos e apropriação indevida de investimentos públicos					
	Adiando investimentos em saúde e educação, devido a realização dos Jogos					
	Investimento maciço e desnecessário na construção de novas infra estruturas, estradas, ferrovias regionais, novas linhas urbanas de metrô e aeroporto					
	Gastando dinheiro em instalações desportivas que têm pouco uso após os Jogos					
	Turistas não-esportivos evitando viajar no período dos Jogos					
	Crescimento dos custos de segurança					
	Aumentando preços de propriedade e imóveis nos arredores da área Olímpica					
	Aumentando as taxas de imposto para os residentes da cidade anfitriã					
	Aumentando preços dos bens e serviços					

Inquérito A.5: intensidade dos impactos da realização dos Jogos Olímpicos no Rio de Janeiro

Tipo de impacto	**Designação do impacto**	**Intensidade de impacto**				
		Muito Fraco	Fraco	Moderado	Forte	Muito Forte
Sócio-Cultural	Aumentando a participação do público no processo de tomada de decisão e regeneração urbana					
	Os programa de voluntariado impactam em matéria de educação e de renda das pessoas					
	Aumentando o envolvimento dos moradores da cidade por causa de mais possibilidades de utilizar instalações desportivas					
	Promovendo a saúde pública					
	Aumentando a confiança e conscientização da comunidade					
	Aumentando a emoção e unindo a comunidade anfitriã					
	Aumentando o bem-estar social a partir de investimentos em equipamentos públicos e infra-estrutura					
	Aumentando os efeitos de bem-estar e criação de identidade local e senso de lugar em residentes da cidade anfitriã					
	Aumentando as actividades sociais relacionadas a eventos na cidade anfitriã					
	Aumentando a melhor compreensão de outras culturas e sociedades					
	Aumentando a chance para os moradores conhecerem novas pessoas e maior intercâmbio cultural entre turistas e residentes					
	Reduzindo a criminalidade através de mais acessibilidade e ambiente mais seguro nas instalações desportivas					
	Reduzindo a criminalidade grave e taxas de comportamento anti-sociais como resultado de investimentos em segurança					

	Colocando a cidade anfitriã no mapa, aumentando sua reputação internacional e exposição					
	Aumentando o orgulho devido à melhoria da imagem da cidade anfitriã no mundo					
	Aumentando a promoção de destino multicultural da cidade anfitriã					
	Diminuindo a pobreza na cidade anfitriã					
	Diminuindo a qualidade de vida dos residentes durante os jogos					
	Afastando as pessoas pobres que se reúnem ou vivem na área olímpica e promovendo a gentrificação devido ao novo desenvolvimento (substituição da classe operária pela classe média)					
	Rompimento no tecido social devido a gentrificação					
	Aumentando vandalismo na cidade anfitriã					
	Aumentando a desconfiança entre as autoridades de cidade anfitriã e os cidadãos, devido à falta de transparência					

Inquérito A.6: intensidade dos impactos da realização dos Jogos Olímpicos no Rio de Janeiro

Tipo de impacto	**Designação do impacto**	**Intensidade de impacto**				
		Muito Fraco	Fraco	Moderado	Forte	Muito Forte
Físico	Aumentando a regeneração e requalificação da cidade anfitriã antes do evento					
	Aumentando a oportunidade para a regeneração de áreas problemáticas da cidade anfitriã					
	Renovando os equipamentos urbanos					
	Reduzindo o tempo do processo de requalificação urbana de algumas décadas para menos de 10 anos					
	Fornecendo um incentivo para a restauração de locais históricos					
	Aumentando as acções de protecção do património construído na cidade anfitriã					
	Desenvolvimento da capacidade da indústria hoteleira					
	Melhorando a qualidade do espaço público e do verde urbano					
	Melhorando as instalações públicas na cidade anfitriã					
	Estímulo para melhorar o transporte na cidade anfitriã					
	Aumentando a integração do sistema de transportes urbanos					
	Modernização das redes rodoviárias e ferroviárias e infra-estruturas aeroportuárias					
	Insuficiência das instalações físicas, tais como espaços de estacionamento					
	Crescimento do transporte público e do tráfego do aeroporto					
	Estádios construídos podem constituir um marco para a cidade anfitriã					
	Melhoria da infra-estrutura no entorno da área Olímpica					
	Áreas urbanas degradadas devido à não-utilização da nova infra-estrutura esportiva depois de terminar os Jogos					
	Construção pesada de equipamentos públicos que não são essenciais ou sao muito luxuosos					
	Danos urbanos e físicos devido à falta ou fraqueza de planejamento e controle					

	A superlotação das instalações locais e instalações esportivas durante os Jogos					

Inquérito A.7: intensidade dos impactos da realização dos Jogos Olímpicos no Rio de Janeiro

Tipo de impacto	**Designação do impacto**	**Intensidade de impacto**				
		Muito Fraco	Fraco	Moderado	Forte	Muito Forte
Ambiental	Desenvolvimento do transporte verde					
	Oportunidade para melhorar a qualidade da água e do ar, eliminação de resíduos e desenvolvimento de energia limpa na cidade anfitriã					
	Desenvolvendo um ambiente mais verde					
	Aumentando a consciência com o ambiente natural					
	Criação de novos princípios de proteção ambiental e fontes de energia renováveis					
	Aumentando o congestionamento do tráfego					
	Aumentando a poluição do ar devido ao aumento do transporte público e do tráfego aéreo					
	Aumentando a poluição sonora					
	Alto consumo de água, energia e resíduos não-recicláveis					
	Pegada de carbono e aumento das emissões de gases com efeito de estufa e CO2 devido ao grande afluxo de visitantes					
	Poluição causada por demolir estruturas temporárias dos Jogos Olímpicos					
	Os danos ambientais devido à ausência de avaliação e monitoramento dos impactos ambientais dos programas, planos e políticas					

Agradecemos seu tempo e sua opinião. Por favor, preencha os círculos que melhor definem Você.

Perito em:	**Especialista que trabalha em:**
o *Turismo*	o *Universidade*
o *Planeamento do Território*	o *Empresa*
o *Engenharia civil*	o *Consultoria*
o *Economia*	o *Administração Pública*

Por favor, sinta-se livre para adicionar comentário: