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# Olympics' Impacts in Rio de Janeiro's Urban Sustainability

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## Abstract

The aim of this paper is to discuss the relationship between sustainable urban transformation and hosting a sport mega-event. Therefore, indicators were extracted from the literature review of impacts in four dimensions (physical, economic, environmental and social). Corresponding factors were compared with sustainability sub-themes in order to evaluate whether hosting the 2016 Olympic Games in Rio de Janeiro was in line with sustainability goals for the city. Results show that there is a slight alignment between them in terms of event-related transport expansion in the city and green spaces improvement. But, there is a huge gap between the physical, environmental, economic and social-cultural goals of hosting the Games and urban sustainability. Likewise, Rio de Janeiro has not met sustainable objectives in terms of diminishing the mega event's impacts on: urban environment like the offsetting carbon emissions, economic downward trend, social improvement such as reduction of urban poverty, 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.

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## Introduction

The Olympic Games are an exclusive sport mega-event which may provide an opportunity for sustainable urban development. They began to have many impacts on the urban environment of the host city through urban expansion during the sixties and seventies of last century, through urban regeneration during the eighties and nineties and, through sustainable urban form in the beginning of the millennium (Liao & Pitts, 2006). Since then, the trend has evolved from adding new buildings and parks to a comprehensive transformation of the urban environment (Ogden & Pedranti, 2012). Rio Olympics 2016 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". The Sustainability Management Plan of the 2016 Olympics issued in 2013 by the municipality of Rio de Janeiro mentioned the realization of the long-term goals of improving the social, physical and environmental fabric of the city (Municipality of Rio, 2013). However, the promises of the Olympic Games as catalysts of a significant urban development has regularly fallen into decline (Long, 2013). Their contribution to urban sustainable development as synthesized by Preuss (2015) includes accelerating local interventions and transport facilities upgrading. But abandoned and unsustainable use of sports facilities can be seen at a number of different host cities such as, for example, Beijing. In terms of environmental dimension, Diederichs & Roberts (2016) stated that they may help to improve environmental regulations and standards. On the opposite, the carbon footprint associated with mega-events is seen as the most negative environmental impact of hosting the events. In terms of economic impacts, researchers have been discussing the direct

benefits such as economic growth, global investment attraction, tax revenues, employment, and additional sources of revenue (Negrusa *et al.*, 2016). However, the economic impacts of hosting the Olympics tend to be less positive than anticipated because most cities after the games had to face a huge debt (Wills, 2016). In terms of social-cultural dimension, improving the image of the host city is mentioned by Kim & Petrick (2005) as the most positive impact on host city. But mega events also generate social problems, namely increased crime rates, traffic congestion and overcrowding. Although there are several studies on Olympic Games impacts, there is little research on their sustainable impacts on host cities in developing countries specifically. The aim of this paper is to explore the relationship between sustainable urban transformation and hosting a sport mega-event in Rio de Janeiro. In this context, the essential question is what the city has gained at the end of only 45 days of Olympics and Paralympics.

## Materials and Methods

Sustainability assessment is one tool that can be employed for better conceptualizing and defining urban sustainability (Cohen, 2017). In order to identify the degree of urban sustainability transformation in Rio de Janeiro through hosting the 2016 Olympics, a qualitative in-depth analysis was conducted. This analysis is based on impact indicators and selected sustainability sub-themes which are presented in tables 1 and 2. A review of the literature of sport mega-event impacts in developing countries' host cities led authors to extract qualitative indicators from the review of four dimensions impacts (physical, economic, environmental and social). Table 1 shows the impact indicators which were extracted from the research on sport mega-event impacts.

**Table 1:** Mega events' impact indicators in physical, environmental, economic and social-cultural dimensions of host cities

Impact Dimension	Impact Indicator
Physical	Increase of regeneration and redevelopment
	Increase the opportunity for regeneration of deprived and abandoned districts
	Providing an incentive for the restoration of historical places
	Increase the built heritage protection actions
	Development of tourism capability in hotel industry
	Improving urban public and green space quality
	Improvement of public facilities
	Stimulus to improve transportation
	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
Environmental	Improvement of infrastructure in surroundings of the Olympic area
	Urban areas degradation due to non-use of the new sports infrastructure in post-games period
	Heavy construction of public facilities that are not essential or are too luxurious
	Urban and physical damage due to the lack of or weakness of planning and control
	Developing green transport
	Opportunity to improve air and water quality, waste disposal and clean energy development

	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 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 Promotion of city's economy Providing host city residents with long term employment opportunities Wealth generation Increase opportunities of relevant business Increase of small businesses Attraction of more investment in infrastructure and new facilities Increase country's openness and liberalization trade Visitor expenditures boost Growth in tourism in the long-term Improper use of funds and misappropriation of public investments Elimination or postponement of investment in health and education 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 The volunteering program impacts on people's education and income Increased involvement of residents because of possibility to use sport facilities Promoting public health Increase community confidence and awareness Increase excitement and bringing the community together and closer Increase social welfare from investments in public facilities and infrastructure Increase in providing the event-related social activities Increase the chance to meet new people and cultural exchange Reduce serious crime and anti-social behavior rates as a result of investments in security Put the city on the map, increase international reputation and exposure Pride boost due to improved city's image worldwide Increase in multi-cultural destination promotion Decrease poverty Decrease and disruption of residents' quality of life during the games Push away poor people who live in Olympic area due to new development Disruption in the social fabric due to gentrification Increase distrust between authorities and citizens due to lack of transparency
Economic	
Social-cultural	

Source: Own assemblage work, 2015-2017

Sustainability sub-themes were adapted from the European Foundation's Urban Sustainability Indicators (EC, 2015) and International Urban Sustainability Indicators List as analyzed by Shen *et al.*, (2011) and adapted for increased relevance to

sport mega-events context. The impact indicators are compared with the selected sustainability sub-themes (table 2) in order to identify the degree of urban sustainability of sport mega-events' impacts on the host city Rio de Janeiro.

**Table 2:** Sustainability sub-themes related to sport mega-event hosting

Impact Dimension	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 réduction 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 scoring system were set from extremely low (-2) to (2) extremely high, which are described within the range of sustainability as classified below:

-2 = extremely low

-1= low

0= moderate

1= high and

2= extremely high

Their relationship is compared for all the selected dimensions: physical, environmental, economic and social-cultural.

**Results**

The relationship between physical impact indicators and sustainability sub-themes applied to Rio Olympics is illustrated in table 3.

**Table 3:** Relationship between physical impact indicators and sustainability sub-themes

Impact indicator	Sustainability sub-theme			
	Sport infrastructures	Urban mobility/transport facility	Green, space public facilities	public and 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

The results of the relationship between environment impact indicators and sustainability sub-themes are illustrated in table 4.

**Table 4:** Relationship between environmental impact indicators and sustainability sub-themes

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			
Increase the awareness with natural environment					
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

The relationship between economic impact indicators and sustainability sub-themes is illustrated in table 5.

**Table 5:** Relationship between economic impact indicators and sustainability 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 in 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

The relationship between social-cultural impact indicators and sustainability sub-themes is illustrated in table 6.

**Table 6:** 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 branding (city)	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, comparing sustainability sub-themes with impacts indicators clearly demonstrated that hosting

events likely had more negative impacts on Rio de Janeiro in all dimensions. Despite, there being a

slight alignment between sustainability sub-themes and impact indicators in terms of event-related transport expansion in the city and green spaces improvement. But, there is a great gap between the physical, environmental, economic and social-cultural goals of hosting the Games and urban sustainability.

**Discussion**

The obtained results revealed the unsuccessful development objectives of holding the Olympics in the city of Rio de Janeiro. 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 mega events such as sustainable land use planning focusing on usable sport infrastructures and urban equipment improvement shows negative impacts on urban sustainability. In connection with environmental sustainability, the relationship between impact indicators and sustainability sub-themes, evidences failure 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 stated in the candidacy files. With regard to economic sustainability, the relationship between impacts indicators and sustainability sub-themes shows that sustainable goals have not been achieved in the context of economic promotion, such as long term tourist interaction and long-term employment opportunities. Rio de Janeiro actually has had little economic improvement through infrastructure development and any economic promotion from the events were expected by the Global Credit Research (2016) to be short and temporary. Horne & Whannel (2016) showed that the costs of Olympics sport infrastructures were far higher than the original estimate. According to the BTI Report of Brazil (2018), both GDP growth and unemployment rate of the country between 2013 and 2016, coinciding with the preparation and hosting of the Olympic Games, show negative trends. Table 7 illustrates economic indicators of Brazil in this period in which GDP declined from 3% in 2013 to -3.6% in 2016 and the unemployment rate increased from 7.1 % to 11.5 %. Additionally, as Figrola (2018) pointed out, Rio is facing a heavy financial and economy crisis with government in chaos just one year after the Olympics. Under such economic conditions, focusing on environmental sustainability is compromised or even impossible, as remarked by Trendafilova *et al.* (2017), especially from a financial standpoint.

**Table 7:** Economic indicators of Brazil between 2013 and 2016

Years	GDP (\$ M)	GDP growth (%)	Unemployment (%)
2013	2 472 807	3.0	7.1
2014	2 455 993	0.5	6.8
2015	1 803 653	-3.8	8.5
2016	1 796 187	-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/>

In connection with social-cultural sustainability, the relationship between impact indicators of mega-events and urban sustainability sub-themes derives that it is very 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 Olympics' sites 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 as fair in terms of world city status (city branding) and social activities. In association with urban safety and security, Rio achieved positive results in creating neighborhoods' security between 2008 and 2016. Nevertheless, this level of safety could not continue after the Games and, insecurity is once

again rising up and criminal gang's activities have started to grow according to Frigola (2018).

**Conclusion**

This paper 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. Results revealed that event-related transport improvement and green spaces development were slightly aligned with sustainable development in Rio de Janeiro. However, this city has not met sustainable objectives in terms of diminishing impacts on: urban environment like the offsetting of carbon emissions, economic growth downward trend, social improvement such as reduction of urban poverty, physical development. This short-term assessment

leads to the conclusion that the Rio 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.

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