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ARTICLE



Event legacy framework and measurement

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ABSTRACT

This article presents the development of a new approach for measuring mega sport event legacy and is based on the Olympic Games as a reference. The legacy of mega sport events has gained ever more importance during recent years for both academics and practitioners. While the sport organisations gain large revenues, cities lose. Such costs, mixed with political discussions over host government spending of public money, seem to evermore prove that there is the potential for corruption, and increased scrutiny by a variety of stakeholders has led to concerns over the benefits of the Olympic Games for the host region. Thus, the politicians call for referendums and over the past 6 years all of the referendums had negative results. Therefore, the research aims for this article are to identify the long-term costs and benefits of staging the Olympic Games and at least suggest some possible methodology for the measurement of those costs and benefits. The focus of the article is set investigating the shortcomings regarding legacy literature. A previously built theoretical framework will be expanded to provide a better manageable legacy framework.

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Introduction

Globalisation, digitalisation, mediatisation and entertainment have turned the Olympic Games and other mega sporting events into multi-billion dollar projects. While the sport organisations generate huge revenues, the host cities best cover the costs of the events when they create a long-term, sustainable legacy (Madden and Giesecke 2012, July 26, Gibson *et al.* 2014). The high costs mixed with political discussions by host government spending of public money (Newman 2012, Lundy 2013) and the subsequent increased scrutiny by a variety of stakeholders (Hall 2006) have necessitated the generation of sustainable legacies from the beginning of the Olympic Games (Mihalik 2000, Coakley and Souza 2013). Even though the Olympic Games can inspire mankind and entertain them by staging one of the biggest peacetime events on earth, politicians like to attach the continuation of their bid to a positive public referendum which is held locally. This is critical to the Olympic Movement because over the past 6 years, nearly every referendum has failed and some cities even withdrew their bid before they had a referendum because of a lack of public support (Könecke and De Nooij 2017). To change this outcome, a variety of stakeholders now must look at how a sustainable legacy can be achieved by hosting the Olympic Games.

Recently, the International Olympic Committee (IOC) actively looked at the concept of legacy, as it is the best argument with which to illustrate the lasting benefits that are derived from the Olympic Games (Grix 2014, Leopkey and Parent 2012, Misener *et al.* 2013, Preuss 2007, 2015, Reis

et al. 2016). Despite the changes which the IOC has effected, the perception of the legacy of the Olympic Games remains challenging. According to the Olympic Agenda 2020, the IOC shaped a new bidding process. For the Olympic Winter Games 2026, the selection will be tailor-made. The IOC introduced an assistance phase during which cities that are considering a bid will be advised by the IOC about bid procedures, core Games requirements and how previous cities have ensured a positive bid and also Games legacies (IOC 2014, R1). Thus, the planning of Olympic Games must consider the infrastructure and needs of the population in each candidate city. The IOC aims to consider the maximum use of existing facilities and the use of temporary and demountable stands for sports venues, whereby no long-term venue legacy need exists or none can be justified (IOC 2014, R1).

Therefore, the research target is:

- (1) To identify different ways to measure and formulate a strategy for controlling the long-term costs and benefits from staging the Olympic Games.
- (2) To turn the scholarly knowledge about legacy into a comprehensive framework
- (3) To provide direction of how this framework can be used in practice.

This research target also has a practical implication. The motivation to provide evidence for, and thus measure, that legacy emerges from the Olympic Movements' desire to legitimise the increasing public costs of Olympic Games. A proven positive legacy would increase the power of the IOC by encouraging more cities to take an interest in staging the Olympic Games (Girginov and Hills 2008, Misener *et al.* 2013). However, a negative legacy can warn future bid cities to better plan their legacy. Overall, the IOC needs evidence and measurement tools with which to better consult interested cities, as that is a central part of the new dialogue process in the first stage of bidding (IOC 2018, p. 10).

First, this paper reviews the evolution of the legacy, with an aim of including the most sophisticated papers on legacy within the literature. The focus is on the shortcomings regarding the legacy literature. Second, the theoretical framework from Preuss (2015) will be expanded to provide a better manageable legacy framework (LF). Finally, a discussion on the measurement of legacy is made. In conclusion, the focus is on the practicability of the framework.

Milestones in the legacy concepts of the Olympic Games

The first use of the word legacy in regard of the Olympic Games was for the 1956 Melbourne Olympic Games (N.N., 1965). Much later, in 1981, the 1988 Calgary candidature file appointed the specialised sports facilities to train high-performance sport as a planned legacy (N.N. 1981, p. 132). Even though the term legacy was used, it was not formally assessed at that time. It was only in 1987 that the first international conference dealing with the subject of legacy was organised in Seoul (see in particular Kim, 1987, p. 195). In 1991, the Organizing Committee for the 1996 Centennial Olympic Games in Atlanta included the goal to leave a positive physical and spiritual legacy in its mission statement (ACOG 1997, pp. 23–24). In 1997, the Candidature for the 2004 Olympic Games in Athens presented its project 'A legacy for Olympism' (Theodoraki 2009, Chappelet 2012). Becoming aware that legacy is not just a sport venue that is left in disrepair, the IOC initiated a congress on 'The Legacy of the Olympic Games: 1984-2000' in 2002. It attempted to define legacy, but the participants 'found that there are several meanings of the concept, and some of the contributions have highlighted the convenience of using other expressions and concepts that can mean different things in different languages and cultures' (Moragas, Kennett & Puig, 2003, p. 491).

It was only from 2000 onwards that the IOC requested a legacy planning from each applicant as part of the bid process. Even though those were delivered for the bid, the organising committees did not follow them, as their duty is limited to producing the 'perfect Games.' Theodoraki (2009)

evaluated the ways in which the bid was assessed, and how the organising committee of Athens 2004 accessed and communicated the event's intended and achieved legacy. It was only in 2012 that the London organisers seriously took care to have a legacy plan for each construction project that was coordinated by the Legacy Trust UK (Girginov 2013, p. 169). However, that was initiated by the host and not by the organising committee. Thus, the IOC founded a new IOC commission, the Sustainability and Legacy Commission in 2015. Regarding legacy, this commission will have to consult, coordinate and monitor the legacy of the Olympic Games (IOC 2018, p. 44). Even though Tokyo 2020, Beijing 2022 and Paris 2024 all have a great sense of awareness towards their legacies, it will only be for the 2026 Olympic Winter Games that bid cities will get a full consultancy by the IOC, and they will be forced by their host city contract into tracking their legacy for a period of several years after the Olympic Games (IOC 2018, p.25).

Literature review on Olympic legacy

The concept of a legacy of mega events is an often-researched area, even though it appears that there are only a few good papers in the literature. The most sophisticated publication on legacy is that from Leopkey & Parent (2012), who mapped and contextualised the evolution of the concept of legacy over time. Thus, they broadened the concept of legacy that is, in many studies, still limited to urban regeneration and infrastructure. They added many intangible aspects and they also added the change of governance as a legacy. Chappelet (2012) promotes the idea that legacy is multifaceted. When Preuss (2007) defined legacy by looking at five dimensions (space, time, tangible/intangible, positive/negative and planned/unplanned), Chappelet adds to those five, the dimensions of territorial/personal, global/local and sport/nonsport related. It is noteworthy that Chappelet stresses the point that each legacy has to be seen from the perspective of a particular stakeholder. Recently, Grix *et al.* (2017) aimed at conceptualising legacies. The problem is that most authors focus on legacy outcomes for particular stakeholders and not on the structures that were changed. Preuss (2015, p. 647) finds that, out of the 13 publications that published outcome typologies, the five most often mentioned legacy areas were economics, infrastructure, social, sport and culture. Grix *et al.* (2017) found similar results with economics, urban regeneration, national pride/feel-good factor, increased participation in physical activity and international prestige and 'soft power'.

In the following, only those studies are mentioned that use valid methods with which to measure legacy. Minnaert (2012) provides a good study by not only looking at infrastructure changes but also at other outcomes. McCartney *et al.* (2010) present a systematic literature review (54 sources) on the effects of major multi-sport events on health and socioeconomic determinants of health in the population of the city hosting the event. However, they do not provide evidence to confirm or refute expectations about the health or socioeconomic benefits for the host population of previous major multi-sport events. Similarly, Weed *et al.* (2015) questioned whether the Olympic Sport demonstration effect (elite sport, sports people and Olympics) could inspire people to actively participate in sports themselves. They found no evidence of that for London 2012 that, other than a potential demonstration effect which, if properly leveraged, may deliver increases in sport participation frequency and re-engage lapsed participants. The study by Grix *et al.* (2017, p. 210) came to the same result. Kassens-Noor (2016) analysed the transport legacies of the Olympic Games and found that transport legacies were much more uniform across the host cities than the more place-specific infrastructural legacies of sport venues. Overall, it is found that, in most cases, legacy is not analysed and empirical studies are limited to collecting subjective (expert) opinions which can be verified by the two recently published literature reviews from Scheu and Preuss (2017) and Koenigstorfer *et al.* (2017).

Scheu and Preuss (2017) undertook a systematic review of the Legacy of the Olympic Games. They assessed 204 studies from books and journals which consider the Olympic Games throughout their entire history from 1896 onwards. In summary, they found a lack of studies investigating a

legacy later than 5 years after the Games, a lack of a valid measurement of a tangible legacy by using appropriate indicators, a lack of methods for measuring intangible legacies and, finally, that only a limited number of legacies had been measured.

Koenigstorfer *et al.* (2017) investigated 235 journal articles on impact factors concerning mega sport events ranging from 1997 to 2016. They found similar shortcomings and claim that five areas would be a better consideration in the future: A better validation of the model behind each legacy measurement. Further, they would like to see the measurement of internal validity of legacies, instead of only external validity. To understand a legacy for a region, more than one stakeholder perspective should be considered. The authors tend to overlook that legacy has different values from different perspectives. Most studies lack the measurement of actual behaviour, while focussing only on the intention to do things. Finally, Koenigstorfer *et al.* (2017) noted a lack of cross-cultural studies that would distinguish event-specific outcomes from mere generalisations.

Basis for a legacy framework

Not only have scholars provided several definitions on legacy (Chappelet 2012, Thomson *et al.* 2013), but also the IOC has already included a legacy in its Olympic Charter of 2003. In 2017, the IOC Sustainability and Legacy Commission defined legacy as follows: 'Olympic legacy is the result of a vision. It encompasses all the tangible and intangible long-term benefits for people, cities/territories and the Olympic Movement'. (IOC 2018, p.13). For a measurement of legacy, this definition is not precise enough and it does not provide a definition of the word itself. This definition solely accounts for all worldwide benefits (outcome) which stem from the vision which is created by hosting the Olympic Games.

The definition of legacy is often cited as 'planned and unplanned, positive and negative, tangible and intangible structures created for and by a sport event, which remain longer than the event itself' within a specific time and space (Preuss 2007, p. 86). This definition is technically better than that of the IOC and refers to the six possible structural changes presented in Preuss (2015). According to this definition, a structural change can be tangible (infrastructure) or intangible (better skilled people, knowledge and sport governance). However, legacy itself is not the structural change, but is rather the consequence of this change. Furthermore, there is no description of whom or what became affected by the changes and the fact that the change must remain longer than the event is limiting legacy to the post-Games period. However, the innovation process and legacy creation often starts with the bidding process up to 9 years before the Games. Therefore, the following definition is suggested: Legacy is '*any outcomes that affect people and/or space caused by structural changes that stem from the Olympic Games.*'

For the practical application, this legacy can be translated as:

- (a) people (or several stakeholders) are affected by and/or
- (b) the environment (city and nature) is affected by
- (c) changes (tangible or intangible) that are
- (d) caused by the Games (often developed indirectly by the Games).
- (e) The outcome can be neutral, positive or negative. A negative legacy reminds us that outcomes may be unintentional (intention).

Time and space are not particularly considered in the definition. However, for the practical measurement of legacy, that becomes important and is considered later in this article.

Before measuring, we need to differentiate the term legacy from that of impact. Impacts are outcomes that are directly connected to the staging of the Olympic Games (IOC, 2009, p. 27). Therefore, the IOC has initiated the Olympic Games Impact Study in order to analyse the impact that hosting the Olympic Games has on a host city and its community (IOC, 2009, p. 44). The study is based on the three recognised areas of sustainable development: economic, sociocultural and

environmental. Legacies are also impacts, but only those that are caused by the structural changes that were previously made by the Olympic Games. Legacies last much longer because the structural changes create ever new consequences.

To validate a legacy, one needs to consider causality. Causality is present if structural change was initiated by the Olympic Games. However, that is sometimes difficult to manifest because it needs an interpretation if a particular change would also not have occurred without the Olympic Games. That is particularly difficult regarding urban regeneration, economic development or when measuring tourism effects. It is easier to argue causality when the structural change is directly related to the Olympic Games, such as an Olympic innovation, sport development, upskilling people or the environmental damage (to name a negative legacy with this latter).

To measure a legacy, we also need to know whether we measure an outcome of some event or we measure a process. Koenigstorfer *et al.* (2017) define a legacy as a process which means that the time span for measurement is infinite (e.g. increase in global warming due to carbon dioxide emission by building event infrastructure). Legacy can be regarded as a process and/or as an outcome (Preuss 2015). If legacy is defined as outcome, it must refer to a certain time span. Even though this enables us to measure a legacy, we need to accept that a given time span limits including the entire picture of a legacy.

Based on the existing literature that is related to legacy, empirically ascertainable facts are now used to inductively build the LF. This theoretical framework is built on a system of empirical examples of legacy to detect regularities that repeat themselves and, thus, allow conclusions about a generality. The legacies found by reviews (Koenigstorfer *et al.* 2017, Scheu and Preuss 2017) must base the empirical evidences on some fundamental premise (FP). This ensures, that what we measure, is certainly a legacy. Based on the knowledge and discussions gained by the two systematic reviews, we derive seven FPs that will present the basic assumptions of the LF.

The Olympic Games are a mega event and their preparation needs a period of 7 years and costs billions of dollars. The preparation changes a city and demands a large workforce. The value created here is just a value-in-exchange, because the investment in the Games simply make structural change to a city. However, a value-in-exchange must be a first step to prove that the change was actually initiated by the Olympic Games. Therefore, the first FP provides the legitimisation (causality) for a legacy. A framework for the analysis of legacy should be based on the first FP.

FP 1: Olympic Games always cause a change of existing structures

These changes affect the space (nature or city) and, therefore, directly or indirectly affect the people that live in this environment. Any structural change modifies a location. A modified location is more or less attractive for activities. Whether the structural changes are tangible or intangible does not matter. The better or worse location changes people's opportunity to achieve new impacts. In other words, a structural change is now in creating a value-in-use, because the new structures are used for new impacts. Chappelet (2012, p. 81) and Koenigstorfer *et al.* (2017) call these 'consequences', which – depending on a better or worse location – can be neutral, positive or negative. The consequence of changes is expressed in the second FP.

FP 2: Structural changes have a consequence for people and/or space

Each structural change causes a consequence and, thus, creates a value. However, the amount of value for someone depends on other people and/or firms and/or environmental circumstances. For example, a former industrial site (brown field) was re-urbanised by the Olympic Games because firms wanted to move headquarters or offices in this city, business owners wanted to open shops and residents preferred housing in close proximity to the city centre. These stakeholders increase the value for people that already live in that area. For example, the re-urbanisation (cleaning) of a

brown field is even more valuable, the more the soil was already poisoned by oil or chemicals. The environmental circumstance (poisoned soil) implements the cleaning of the brown field (structural change) having the consequence (health of citizens) and, thus, increased the value for those living in that area – in addition to the shops that are opened and the firms that settle. We observe a co-creation of value from different stakeholders in this location. Another example is a new stadium for the Olympic Games (structural change). The value for the venue is high, if there is a firm (sport club) demanding a venue for its professional team and/or people (spectators) seeking a large modern stadium for their entertainment. The value of the consequences is, again, determined by the co-creation from stakeholders (firm and spectators). An example for an intangible structural change is an education programme about girls in sport (London 2012, 'This Girl Can' campaign) which caused a change in peoples' attitudes (structural change). The consequence is that girls like to participate in more sport opportunities. The value gets co-created by the sport club (firms) offering sport for girls and coaches having skills to teach and motivate girls. This drives us to FP 3.

FP 3: The consequence of a structural change creates value determined by a co-creation of firms, stakeholders and environmental circumstances

FP 3 is closely related to the next premises. Each person has a different background, socialisation and motivation. The context in which a person perceives the consequence of a structural change influences the individually perceived value. For example, the sale of the Olympic Village as middle-class housing is only of interest for those middle-class citizens that are searching for accommodation in that particular city or in a specific city location. The context is different for a poor person who is not looking for such accommodation. Even worse, what is the situation for lower income persons that previously lived in that area? The Olympic Games displaced them out due to gentrification (Käufer 2012, p.27) of the area as seen in the London, 2012 urban renewal of East London or the demolition of hutongs in Beijing. In this context, the value that is co-created by investors and politicians is negative for the previous inhabitants. Therefore, the legacy can severely differ among stakeholder groups (Koenigstorfer *et al.* 2017, Preuss 2015, p. 654; Thomson *et al.* 2013) because they perceive a consequence of a structural change in a different context. The next FP will, therefore, point to the different value for different stakeholder groups.

FP 4: The value of consequences from a structural change is always a value-in-context

The number of legacies provided by Olympic Games is very large. The consequences of a structural change for people and space occur in different branches (Preuss 2015, p. 652) such as sport, culture, health, education, tourism or the economy. The IOC refers to this as 'dimensions' in which legacies occur (IOC 2018, p.17).

The consequences change the conditions for a particular industry or social area. Then, the better or worse location changes the quality of life. It does not matter if it affects people directly or via the environmental changes indirectly (e.g. air pollution affects the health of people). A measurement of the increase of the quality of life (Kaplanidou and Karadakis 2010) should be the overall aim for those staging the Olympic Games. Any vision of the Olympic Games should focus at that aim, which the IOC calls 'building a better world through sport' (IOC 2018, p.30). That is the true currency of any legacy measurement and explains FP5:

FP 5: The consequences of a structural change occur in different areas/branches and affect the quality of life

Our environment is in constant change. Logically, legacy (as a consequence of a structural change for an infinite time) is a dynamic concept. That means that structures, consequences of these structures and stakeholder evaluations change over time depending on situational characteristics. When stakeholders change or the environmental circumstances change, then the value of co-creation also changes from time to time. To take the above-mentioned example, imagine that the club that uses the new stadium gets down-relegated. Then, the legacy changes because the stadium loses its positive value when a stakeholder (here, the down-relegated club) is leaving the network. The next FP considers this dynamism of legacy.

FP 6: The value of consequences from a structural change alters over time

The structural change can affect people and space at different spatial levels. Some legacies can be individual (e.g. someone uses a learned skill), local (e.g. the change of living conditions in a previous Olympic Village (Chappelet 2012, p.84)), national (e.g. the national pride increases (Close et al., 2007)) or even international (e.g. enhanced international recognition or soft power strategies (Grix and Brannagan 2016)). The last FP shall, therefore, address what is always a specific territory in which we can find a legacy.

FP 7: The consequences of a structural change is always bound to a territory

Table 1 provides an overview of the LF based on 7 FP. FP1–FP2 express the nature of legacy and are the basic assumptions of the LF. FP3–FP5 determine the value of the consequences from structural changes. FP6–FP7 open the framework to being flexible in time and space.

Table 1: Legacy Framework (source: own elaboration)

The LF aims to provide guidance for analysing the legacy of the Olympic Games. To break the framework down into manageable units and to find appropriate measurement tools for the different kinds of legacy, we have to define possible structural changes. These should not overlap in order to avoid double measurement and they should describe changes irrespective of the branches/industries and their potential consequences for the different stakeholders.

Driven by empirical evidences, literature reviews and inductive conclusions, we can distinguish six structural changes, two of which are related to space and four are related to people.

(1) Urban development (space)

This includes any infrastructure change in the host city, such as the development of transport and mobility infrastructure. In literature, this is often called urban regeneration and one of the most often-mentioned legacies. Basic urban infrastructure (housing, water, sanitation, power supply, solid waste disposal and other public amenities) and advanced urban services and infrastructure (telecommunications, police stations, enhanced safety and security features, hospitals, smart city grids, hotels, smart buildings, etc.) are necessary to improve the quality of a city. The upgraded or

Table 1. Legacy framework (source: own elaboration).

	Fundamental premises	Explanation
FP1	<i>Olympic Games always cause a change of existing structures</i>	Nature of legacy, assumptions taken from definition
FP2	<i>Structural changes have a consequence for people and/or space</i>	
FP3	<i>The consequence of a structural change creates value determined by a co-creation of firms, stakeholders and environmental circumstances</i>	Value creation from legacy for people
FP4	<i>The value of consequences from a structural change is always a value-in-context</i>	
FP5	<i>The consequences of a structural change occur in different areas/branches and affect the quality of life</i>	
FP6	<i>The value of consequences from a structural change alters over time</i>	Flexibility of the framework
FP7	<i>The consequences of a structural change is always bound to a territory</i>	

new sport venues and parks develop sport opportunities, but also can affect sport when it is used for social/economic purposes after urban regeneration

The consequences of these changes create value, which depends on the context in which stakeholders use it and the co-creation given in the location. For example: a permanent sport venue that is not used for sport (missing co-creation by club, fans, shops, etc.) costs money to maintain and, thus, draws that money from other spending which makes the consequence negative for most stakeholders (not for those maintaining it because in their context they have a job). However, the non-used venue can become an iconic building (e.g. Bird's Nest in Beijing 2008) and the consequence is that it provides value when tourists, tourism companies, city governmental authorities and tour operators co-create a tourism place out of the venue. Another example is the Games that caused construction of a pedestrian zone (Barcelona 1992, Athens 2004) or a park (Munich 1972, Montreal 1976, Seoul 1988, Atlanta 1996, Sydney 2000, Beijing 2008 and London 2012), with the consequence of being a recreational area which benefits the co-creation of entertainment industries (concerts, sport events), restaurants and public transportation connections. These, in turn, can improve an urban landscape to the benefit of its neighbourhood population.

(2) Environment enhancement (space)

This addresses any improvement in air and water quality, e.g. due to low-carbon technologies or at least a minimisation of the carbon footprint. The city gets green space, trees are planted, oxygen is produced and fine dust is reduced; the biodiversity increases, animals get living space; former industrial land (brown land) gets cleaned; recycling becomes introduced and waste is minimised. Therefore, less resources are used.

The consequences of these environmental enhancements create value, depending on the context of the stakeholders or the context of the environmental condition. Many cities have built energy efficient and eco-friendly buildings and venues for the Olympic Games (e.g. Lillehammer 1994, Beijing 2008, Youth Olympic Games Innsbruck 2012) and some cities also installed solar panels (Sydney 2000). Other cities reduced greenhouse gas emissions by introducing the BRT (bus rapid transportation) bus fleet such as in Rio de Janeiro (Lindau *et al.* 2016), the 4,000-strong fleet of buses powered by natural gas in Beijing (UNEP, 2009) or hydrogen buses in Vancouver (Kidd 2011). The first waste recycling treatment plant (Sochi 2014) reduces land use for waste and the brown land at Homebush Bay (Sydney 2000) which was cleaned of dioxin. In London, the waterway network was regenerated, a wastewater treatment facility was built and high levels of water saving could be achieved (ESRC 2015). Whether Rio de Janeiro 2016 and Beijing 2008 achieved better water quality at rowing sites or harbour areas may be open to debate, but at least efforts were undertaken to improve the situation. The consequence affects the environment and indirectly affects the health of the inhabitants.

(3) Policies, governance (people)

This includes all changes of laws, any new regulation, the introduction of binding guidelines and policies. Better governance and new organisational structures are also included under this structural change. It can also be the establishment of quality seals, quality control processes, a protection or new organisation of property rights and regulations in construction. It can include the protection of human rights, laws to protect the environment or a species and regulations to help elderly or disabled persons. New policies can help create a new curriculum in schools or programmes and guidelines in security practices (evacuation policies).

The consequences of changes in policies and governance create value, but again, they depend upon the context in which the stakeholder is addressed by a policy. Thus, a curriculum change to increase school sport increases the value of sport for children. In co-creation with available venues

and educated sport teachers, the value gets greater. Other examples are the quality charter for sport events (Vancouver 2010) or sustainable food policies from the London 2012 Games (Daothong and Stubbs 2014). The reform of the high-performance system in the UK (London 2012) new anti-doping policies after the Russian doping scandal (Sochi 2014) or any better governance structures of national/international sport federations or new police crowd-control regulation (Germany WC 2006) are other examples of consequences. However, to name a negative change, Rio de Janeiro lost functioning anti corruption regulations (public procurement procedures) because of the pressure of time constraints and scheduling which released the public authorities to be compliant.

(4) Human development (people)

This structural change is composed of three areas in which an individual can change. First, someone can learn new skills. For example, to cook, to serve customers, to practice a sport, to drive a car, to speak a language, to be a leader or to undertake a security check. New skills help to generate talent in different fields (technology, law, architecture, project management, the arts, etc.).

Second, someone can attain new knowledge. Some of the skills above are connected to knowledge, e.g. cooking is based on knowing recipes, language needs vocabulary, etc. The Olympic Games also teach knowledge about sports management, media, broadcasting, tourism and hospitality. People abroad get more knowledge about the host nation and its culture.

Third, someone can establish new contacts and, thus, networks are built. These can be among volunteers, diplomatic connections, police forces, sport federations or tourism providers.

The consequences of changes in human resources create value and depend on the context in which the stakeholder needs these skills. A skill that is never used or knowledge about something anyone needs does not lead to any consequence that creates value. However, sometimes, much later, an environmental circumstance or other stakeholders require those skills, knowledge or networks and then the location is ready to transform that opportunity into a value. Examples for this, regarding skills, were English language skills in Nagano 1998 (Nakamura and Suzuki 2017) or Beijing 2008 or the upgrade in hospitality (cooks, service personal) in Sydney 2000, Barcelona 1992 and other locations when tourism increased after the Games. Examples of new knowledge include public transportation in Sydney 2000, waste management in Russia 2014 or the better knowledge of other nations due to national presentations in Rio de Janeiro 2016 (by visiting National Houses). The consequence of the better knowledge about the host nation means an increased global profile and may then lead to increased tourism. Co-creation with other tourism stakeholders, media and environmental circumstances adds value. An example for better networks is the better connection of national sport federations to their international federations, more collaboration between alpine institutions after the Torino Winter Olympic Games (Bondonio & Mela, 2008), tourism agencies connecting via the Vancouver 2010 (Sant, Mason & Hinch, 2015) or the Sydney 2000 Games. Universities started international partnerships in Sochi and security forces exchange information to better fight terrorism. Australia started seven new trade missions after Sydney 2000 and the Seoul Olympic Games have marked the beginning of trade and diplomatic relations with Eastern European countries for Korea (Yoon 2009).

(5) Intellectual property (people)

This structural change takes account of everything that is invented or newly created through the Olympic Games. Innovation can occur in different fields (materials, technologies, business models, sports entrepreneurship, etc.). Inventions can be new designs, brands, visual identity and artistic activities (music, visual arts, etc.). They often get developed throughout the ceremonies.

Their consequence can be new arts/music styles (Seoul 1988) or just the new Olympic songs. The pictograms from Otl Aicher for Munich 1972 (the geometric man) (Mandell 1984, p. 255) are

used worldwide until today. Other examples are the patent on how to clean dioxin from soil (Sydney 2000) or the new methodologies for measuring the carbon dioxide footprint of mega events (London 2012). Also, for the London 2012 Games, the new ISO 20,121 standard that helps organisations to improve the sustainability of an event was developed. Meanwhile, the standard has been adopted widely across the world (ESRC 2015). An innovation that became an Olympic tradition is the torch relay (Berlin 1936). Furthermore, cinematography was developed in Berlin (invention of slow motion, radical cutting, perspective change) (Ch.-S 1987, p. 195) and many nations develop sport equipment to better perform at the Olympic Games, such as the new speed skating shoes from the Netherlands for Nagano 1998 or the spiked shoes invented by Adi Dassler for the Olympic Games in Amsterdam 1928. See other examples in Kim (1987, pp. 195–198).

(6) Social development (people)

This structural change is related to social development and addresses the beliefs of people and their habits. The change of someone's mind (beliefs) means that one thinks differently about racism, peace, females participating in sport, foreigners, environment, public transportation, national identity, etc. Here, we also can include the often investigated event 'feel-good factor' (Maennig and Porsche 2008; Lundqvist, 2011) and soft power (Grix and Brannagan 2016; Manzenreiter, 2010). Feel-good and soft power are changes of the mind of respondents because they start to see and feel things differently. Then the change of a habit is caused by a change of a belief, but this is not necessarily so. The Olympic Games can change a habit of using public transportation because its availability improves, but one may not stop the habit for a changed belief about environmental protection. Other changes in habits can be the undertaking of more sports, no littering, reading more sport news, etc.

The consequence of this structural change can be a tendency towards nation building by becoming proud of one's nation which is a feel-good (Tokyo 1964, Seoul 1988 and Beijing 2008), developing the ground for democracy (Seoul 1988) or an enhanced international image and positioning (Atlanta 1996, Barcelona 1992, Torino 2006 and Beijing 2008). However, an example of a negative image consequence is discussed in Brannagan & Giulianotti (2015) regarding the soft power sport strategy of Qatar A wished for, but not proven, consequence is that people do more sport and maintain being healthy. In London 2012, the consequence of the new beliefs in the fact that girls can do sport was an increased self-esteem for many girls. An important fact of the consequences from a change in beliefs is that this creates emotions and feelings. Here, the increased value by co-creation becomes obvious. The belief in one's national strength (through winning medals) is greater when co-created with many other beliefs, media reporting, other athletes also winning and environmental circumstances, such as the end of an economic depression or, simply, the fact of the weather being good. Other examples that a change in beliefs can lead, as its consequence, to emotions are the following: a belief that security decreases lead to increases in fear as a consequence; a belief that the economic situation becomes better may produce happiness as its consequence. However, not every change in a belief would also change a habit.

The complete legacy framework

The six structural changes in the above appear for, more or less, every Olympic host and many of them have consequences, whether intended or not and whether positive or negative. The challenge for the IOC and the bid cities is to optimise positive legacy and to leverage it. The value of the consequences becomes positive and increases when changes triggered by the preparation of the Games are aligned with the needs of a city. Therefore, it is very important to start planning for structural changes during the bidding phase.

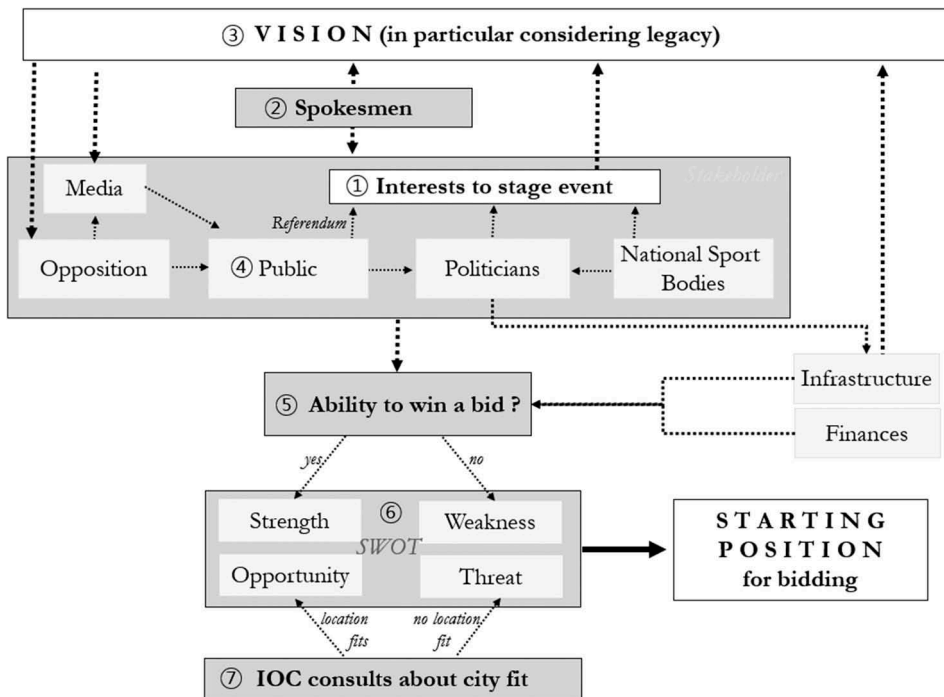


Figure 1. From legacy vision to bidding (modified from Troelsen and Preuss 2008, p. 19) (source: own elaboration).

The IOC was right to already start consulting cities about their potential legacy, before a proper master plan is started. Figure 1 shows the process, explaining the importance of a good legacy vision before bidding and the role of the different stakeholder in this process.

It starts with the vision and leadership of someone in a city, to gather support to prepare a bid (1). This is then postulated by a spokesman (2) who may be influential, powerful or charismatic. At this moment, a vision should already be given which is based on the public's interest, political interest and interest of national sport organisations. As a minimum, following the next bidding process for 2026, the vision should be developed properly in this stage. The infrastructure available (or needed) forms an Olympic vision (3) which is spread by the media.

The media will influence public opinion (4). With a positive public opinion, the politicians may be convinced of the advantages of the Olympic Games (Preuss and Solberg 2006, Lu 2015). Mistakes made in the beginning of the process, e.g. a missing legacy, exorbitant costs, corruption, security shortcomings etc., lead to serious weaknesses during the bid preparations. Often, at this point, a public referendum ends the bid process.

The support of the public, through sharing a unified legacy vision, increases the ability to win a bid (5) if infrastructure and finances are also provided (Preuss and Solberg 2006, Könecke & Nooji, 2017). The new bidding process starts with a 1-year consultancy process by the IOC, which actively checks whether the legacy vision fits to the location and to the Games brand (7). If that is given, a city can undertake a final SWOT analysis (6) and then start the proper bidding process.

Crucial obstacles are winning the public's opinion and convincing the government and political parties of the positive outcome. Figure 1 shows that a vision for an Olympic legacy is the most important part in the pre-bidding process and is needed to start the bidding (Figure 2).

After the election of a host city, the legacy vision needs to be followed, even though over time it may be adjusted to environmental changes. Figure 2 shows that for the preparation of the Games, several requirements must be met, such as the sport venues, broadcasting centre and security.

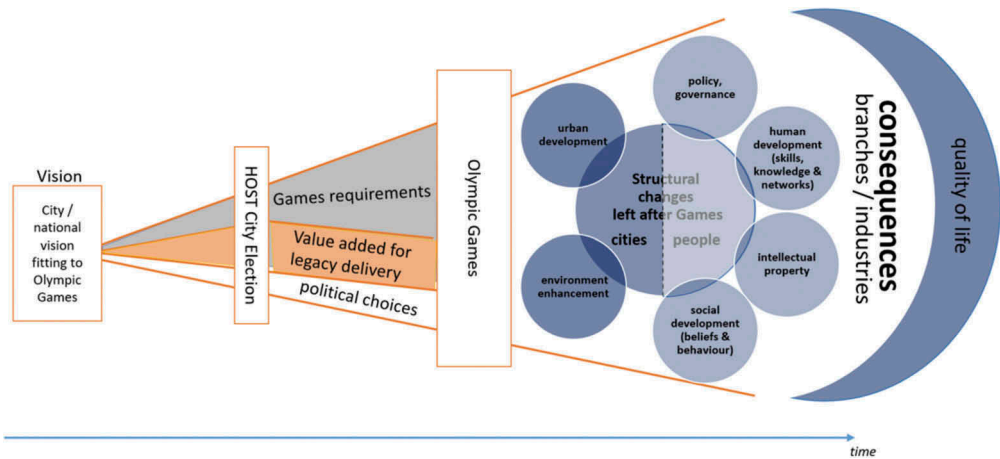


Figure 2. Overall legacy framework (source: own elaboration).

However, often, additional investments help leveraging the expected consequences of a structural change. For example, the early planning of the post-Games use of a venue must occur at the design stage to maximise post-Olympic use as seen with the Atlanta 1996 Olympic Stadium. This Olympic structure was designed from its very inception to become the home of a US professional baseball team. The Atlanta Braves subsequently leased the converted Olympic Stadium for 20 years. Finally, there are always wishes of the host to use the Games for additional changes that are not necessarily related and not required to stage the Games, but which are desirable. This can be a larger and more modern airport (Athens 2004), taking power lines underground (Sydney 2000) or cleaning a river (Seoul 1988), to name a few.

As an outlook, the next step is the real measurement of a legacy. The reviews from Scheu and Preuss (2017) and Koenigstorfer *et al.* (2017) have proven that only very few scholarly papers investigated how to measure the different legacies.

First thoughts on a measurement of legacy

To measure legacy, we need to first set some framing conditions (definition D1–D4) and then create a valid way to measure a particular outcome. The value of a legacy is most difficult to evaluate, because it is based on the context in which a legacy meets the needs of multiple constituencies.

The following four definitions are needed:

- D1: The time span for legacy measurement
- D2: The stakeholders and space for legacy
- D3: The structural changes that should be considered
- D4: The consequences of a structural change for the stakeholder

These nominal definitions will frame the legacy measurement and will provide transparency for the reader about which part of legacy is measured and for which stakeholder group. The measurement tools are by nature different for the different legacies. Thus, the key performance indicators that will make a legacy measurable must be customised for each Games edition (IOC 2018, p. 31). When suggesting methods to evaluate legacy, only some examples can be given. Thus, the following part of this article can be seen as a call to scholars to start thinking about possible

measures to grasp the Olympic legacy in such a fashion to withstand rigorous academic and practitioner review:

(1) Urban development (space)

One could define which infrastructure was changed due to the Games and then investigate different criteria representing the value-in-use for the population (e.g. venues for tourist visit, exhibitions, sport for all, competition and training for high-performance sport). It may be added how many people are using the infrastructure in considering the intensity of use. A rating system should be set up and the measurement is undertaken using a counting method.

(2) Environment enhancement (space)

One could measure the carbon footprint of all structural changes, considering the production chain. Alternatively, we can measure the change of the carbon footprint compared to the pre-Games situation. It is also possible to assess whether biodiversity increased or decreased.

(3) Policies, governance (people)

By qualitative and quantitative measures one could ask people, in organisations that are affected, about the new governance structure or efficiency increases. Here, we need interviews or questionnaires. A pure interpretation of organigrams, government structures, regulations and laws is possible, but very much depends on the view of the interpreter.

(4) Human development (people)

The up-skilling is most difficult to measure. A direct measurement would be to evaluate by interviews or to develop tests to measure the increase of know-how. Another idea would be to assess the growth of business licenses in a community.

The change of networking may be assessed by questionnaire or indirect one can use network measurement tools.

(5) Intellectual property (people)

The fact of have an invention or not can be easily assessed. The valuation of its value is very difficult because inventions often need a long time to develop their power and environments are changing over time.

(6) Social development (people)

Beliefs can only be measured by smart interviews or questionnaires. A change of habits can be seen in the way people act. Depending on what habit shall be measured, we can evaluate the affected structure (e.g. more use of public transportation, more people in sport clubs, less acts of racism, increased or decreased community safety and security data, etc.)

A suggested practical outcome can be that those observed consequences of legacy (e.g. politicians, citizens) can collect information and explain the consequences (narratives). Scholars can then check the narratives for causality. Then, they can be reflected in the six structural changes and will be measured, as briefly suggested in the above. Finally, the context in which each stakeholder uses a legacy should be considered.

Conclusion and limitation

This article sharpens the findings of previous publications on legacy and provides a sound inductively built framework (the LF), based on six FPs. The framework fills the gaps in scholarly work with practicability. It helps to start detecting and valuing a legacy and goes beyond the pure delivering of a theoretical framework or definition which was most often the case in the past (research question 2). Previous scholarly work, as aforementioned, describes legacy outcomes in particular cities for one stakeholder at a specific point in time, often without a test for causality as to whether the Olympic Games really initiated the legacy. The six structural changes that are proposed in this article are new in their composition (research question 1). They are not

overlapping by way of their content and, thus, a valid measurement would not measure a legacy twice. By looking into the industries in which legacy occurs, an outcome for people in a particular region can be assessed. This makes it clear that any legacy measurement is always a tailor-made analysis of where legacy is needed (research question 3). The main limitations in any legacy measurement are twofold. First, is it a valid test for causality? If it is not directly connected to changes made for the Olympic Games, then it cannot be considered as a legacy. However, if the alternative proposal for city development would have had the same structural change that would have been undertaken without the Games, then one needs to discuss the overall value of these changes. Second, it is the evaluation of intangible consequences of a structural change because, by definition, they are 'non-measurable'. Therefore, we may be able to describe the intangible legacy, but we may fail to evaluate it and, thus, find a valid method with which to evaluate them is difficult. Scholars may use indirect measures or contingent valuation measurement (Johnson & Whitehead, 2000) to get at least near to a value for intangible effects. Notwithstanding, when a legacy is measured, it creates different values based on the context in which a stakeholder experiences a legacy.

The next steps are that scholars should start to find valid methods with which to measure the legacy for those structural changes that are imposed and are central for host cities. A potential forum for this conversation and dialogue could be an Olympic Legacy Symposium. This Symposium identifying Olympic legacy measures could and should be based on the legacy vision that was set before bidding (Figure 2). The most interesting are those that maximise the quality of life, because that is and should be the main purpose of any legacy creation.

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