

Johannes Gutenberg-University Mainz
Faculty of Social Science, Media and Sport
Institute of Sport Science
Department of Sporteconomics & Sportsociology
Johann-Joachim-Becher-Weg 31
55099 Mainz, Germany



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A Systematic Review of Academic Publications

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ANJA SCHEU (corresponding author) & **HOLGER PREUSS**
Johannes Gutenberg University of Mainz
Institute of Sport Science
Johann-Joachim-Becher-Weg 31
55099 Mainz, Germany
Email: ascheu@uni-mainz.de

Executive Summary

AIM AND METHOD

The purpose of this review is to report the findings of a systematic review of literature on the legacy of Olympic Games from 1896 to 2016. The review focuses on the legacies for each Games edition as well as on the measurement of legacies. The search process yielded 863 articles. Exclusion criteria were developed and applied. Finally, the review protocol revealed a total of 204 articles included in the analysis.

RESULTS

In the first instance, general results are reported to identify trends by Games editions, methods and facets of legacy. The analysis reveals a significant increase of literature dealing with the legacy of Olympic Games, with a majority of non-empirical articles. Consequently, these articles describe the legacies, but the legacy was not measured. Empirical articles mostly draw from qualitative interviews followed by quantitative surveys. Legacies describing or evaluating structural changes in terms of urban development are addressed most often in the literature. The second largest share deals with structural changes in terms of beliefs and behavior. This mainly includes studies examining the effect of the Olympic Games on the image of the nation/city as well as on physical activity. The areas of skills, knowledge and networks, policy and governance and intellectual property remain under-researched.

After illustrating the general results, a content analysis was used to synthesize the results for each Games edition with regard to the six facets of legacy. For each Olympic Games edition, a narrative synthesis with regard to different stakeholder perspectives was conducted. However, most of the studies take a general perspective and do not differentiate by stakeholder interests. Within the synthesis, methods of data collection and causality – whether the effect is a result of the Olympic Games – were assessed. For most of the Olympic Games editions, structural changes in terms of city development are reported. In most cases the real value of the legacies remains uncertain since studies only describe what was built/achieved by the Olympic Games, and do not evaluate the subsequent use/utility. The same applies to legacies in policy and governance, intellectual property or skills, knowledge and networks. Even if the studies used an empirical approach, the legacies are often only described (e.g. by interviewees) but not measured.

MEASURING LEGACIES

Very few studies succeed in really measuring legacy. Many studies try to measure legacy by using a top-down approach. That is not appropriate for reliable measurement, as such an approach cannot distinguish between effects caused by the Olympic Games or by other (non-Games) agents. The evaluation framework for the London 2012 Games (DCMS, 2009) offers a promising approach, but the framework was not applied for most of the evaluation of the London legacies. However, some general recommendations could be retrieved from this framework.

For measuring and evaluating infrastructural legacies, new objective indicators could be revealed. For the other facets of legacy, promising strategies and recommendations were developed.

CAUSALITY

Very few studies reflected the importance of considering causality. Thus, it often remains uncertain whether the legacy investigated was really caused by staging the Olympic Games. To overcome this, it is proposed to develop an evaluation framework based on program theory by means of logic chains. Logic chains can be used to show the expected causal links between the inputs, outputs and outcomes.

The application of logic chains in practice is missing.

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List of abbreviations

APS	Active People Survey
BRT	Bus Rapid Transit
CANPLAY	Canadian Physical Activity Levels Among Youth
COHRE	Center on Housing Rights and Evictions
DCLG	Department for Communities and Local Government
DCMS	Department for Culture, Media and Sport
ESRC	Economic & Social Research Council
ETOA	European Tour Operators Association
FDI	Foreign Direct Investment
IOC	International Olympic Committee
LAOOC	Los Angeles Olympic Organizing Committee
LOCOG	London Organising Committee of the Olympic and Paralympic Games
LRT	Light Rail Transit
NVA	Net Value Added
OCOG	Olympic Games Organizing Committee
OGI	Olympic Games Impact Study
PARA	Physical Activity Resource Assessment
PRISMA	Preferred Reporting Items for Systematic Reviews Meta-Analyses
QI	quality indicator
RA	Research Atlanta
SEA	Strategic Environmental Assessment
SLC	Salt Lake City
SRO	single room occupancy
TGV	Train à Grande Vitesse
TOROC	Organizing Committee for the 2006 Olympic Winter Games in Torino
TPS	Taking Part Survey
UNEP	United Nations Environment Program
UPP	Police Pacification Units
VANOC	Vancouver Organizing Committee
WHO	World Health Organization

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1 Introduction

Every city undergoes a transition when staging an Olympic Games. Out of this, some stakeholders benefit and others lose. The transition of a city became of ever greater interest, the more taxpayers' money is invested in the event. Billions of euros cannot easily be justified by a 17-day world-class sport event, even one that has considerable entertainment and promotion value. Therefore, it is the duty of politicians and policy-makers to look at the changes that a mega-event will effect on the city, and identify who will be affected by them. In other words, we need to become clear about the legacy of an event.

The legacies of the Olympic Games have gained a high profile, and are part of the Agenda 2020. Cities that bid for the Olympic Games need to have positive legacies to justify the hosting of the Games. Thus, the IOC wants to support bidding cities as well as OCOGs and their stakeholders in better planning and measuring their legacies.

Much has been written on legacy in the past ten years. This literature review aims to bring the different perspectives of legacy into one framework. The analytical scheme of legacy is a first step towards capturing Olympic legacies from past Games, as well as supporting the building of a legacy vision for future Games.

This systematic review will look into:

- a) the detection of legacy (WHAT) in all available publications up to the present;
- b) the perspectives in which legacy can be seen (WHO), which will be done by looking at the stakeholders who are affected by a legacy;
- c) reflection on the time and duration over which legacy occurs (WHEN), which will cover measurement. Here we can see that most legacies are measured right after the Games.

The next step is to complete the analytical scheme with facts about past Games. In order to avoid duplication, this report provides a systematic review of (academic) publications about past Games' legacies. On the basis of this systematic review, the IOC and its commissions can use existing knowledge from previous Games when appropriate, but can also identify research gaps to identify directions for future research.

1.1 Content of analysis

This systematic review of academic publications related to Olympic Games legacies will comprise the following outcomes:

1. General identification of study results and methods concerning the legacy (chapter 4).
2. Analysis of stakeholder perspectives for each legacy as well as time and duration of each legacy measured → finding coherent results as well as inconsistencies (chapter 4).
3. Rough translation of study results into the academic system of the six fields of structural changes of the analytical scheme (chapter 4).
4. Examination of legacy measurement methods that are explained in the literature. Comparison of methods concerning this legacy (chapters 4 & 5).
5. Checking the reliability and validity of the methods used to measure legacies, plus identifying best practices for each facet of legacy (chapters 4 & 5).
6. Evaluate how far the causality between Olympic Games and their examined legacy is explained in the literature (chapters 4 & 6).

1.2 Content and structure of the report

This report is structured as follows. Chapter 2 provides a theoretical background and introduces the legacy analytical scheme. The section goes on to explain the process for article selection, as well as the method of analysis. Afterwards, the results are outlined. The first part of the section provides some general results and shows article trends, and the second part provides the narrative synthesis for each Games edition between 1896 and 2016. Chapter 5 focuses on measurement of the event legacy and summarizes all methods identified by the analysis. Furthermore, general aspects which are important for measuring legacy are outlined. For each facet of legacy, reliable and valid methods are drawn from the synthesis and recommendations are developed. In chapter 6 the problem of causality is addressed. This chapter aims to review theories and methods that are appropriate for analyzing the causal links between the Olympic Games and Games legacies. The last chapter concludes the report and identifies research gaps.

2 Theoretical Background

2.1 Definition of legacy

Although the literature and media attention devoted to mega-event legacy has grown considerably over the last decade, there are still inconsistencies in the definition and conceptualization of legacy. With this development, “the term mega-event legacy has acquired different meanings in different fields to different people.” (Kassens-Noor, Wilson, Müller, Maharaj & Huntoon, 2015, p. 3). Thus, the term is still surrounded by much ambiguity and still lacks an appropriate and universally accepted framework of definition within the sport mega-event context. In addition, the concept of legacy has often been confused with “impacts” or “leveraging”. Many studies fail to identify the difference between the concepts. However, for this systematic review of Olympic legacy it is important to distinguish legacy from other similar concepts, and to define the concept of legacy clearly.

The term “impact” is generally used to describe a short-term impulse or exogenous “shock” (Preuss, 2007). Accordingly, tourism impacts, for example, take into account the consumption of event tourists during the short-term event holding period, whereas tourism legacies consider all additional tourism activity in the host city, e.g. post-event tourism (Li & Blake, 2009). When evaluating event impacts, some authors differentiate between short-term and long-term impacts to clarify the time factor, and whether they refer to short-term or long-term changes. Other authors just refer to impact, making an evaluation difficult.

Leveraging means applying strategies and tactics that can be implemented prior to and during an event in order to optimize desired event outcomes (Chalip, 2004) and is therefore a much more proactive approach.

On the basis of these definitions, it is now possible to approach the notion of sport event legacy, and to distinguish legacy from similar concepts. As already mentioned above, the concept of legacy is complicated because of inconsistent conceptualizations of legacy. Thomson, Schlenker and Schulenkorf (2013) provided a review of literature that sought to define legacy, and which provided 14 definitions. This review draws on a definition proposed by Prof. Holger Preuss: “Legacy is any action (practice) in a given area (e.g. host city) and time driven from structural changes initiated by staging of the Olympic Games.” According to this definition, structural changes are fundamental for legacy. Structural changes last longer than the Olympic Games and offer permanent and ongoing opportunities for action. They are the result of a shift or

change in the basic ways that a social, economic or natural system operates. Thus, it does differentiate from the primary (direct) impact of the Olympic Games (e.g. economic impact or worldwide media interest), which may occur only for a short time and fade as soon as the Games are finished.

2.2 The legacy analytical scheme

The creation of a positive legacy has become a key rationale when bidding for or hosting an Olympic Games. For the IOC, legacy has become a focal point in the Agenda 2020, and the importance of legacy is also established in the Olympic Charter (IOC, 2015). Against this backdrop, the IOC has developed a broad legacy agenda in order to support Games organizers, as well as applicant/candidate cities, to plan and host the Olympic Games in a way that creates positive legacies. For discussion with the IOC, Prof. Holger Preuss has developed an analytical scheme (figure 1) to describe and capture Olympic legacies. The analytical scheme can be used both to capture legacy from past Olympic Games and to support the building of a legacy vision for future Games.

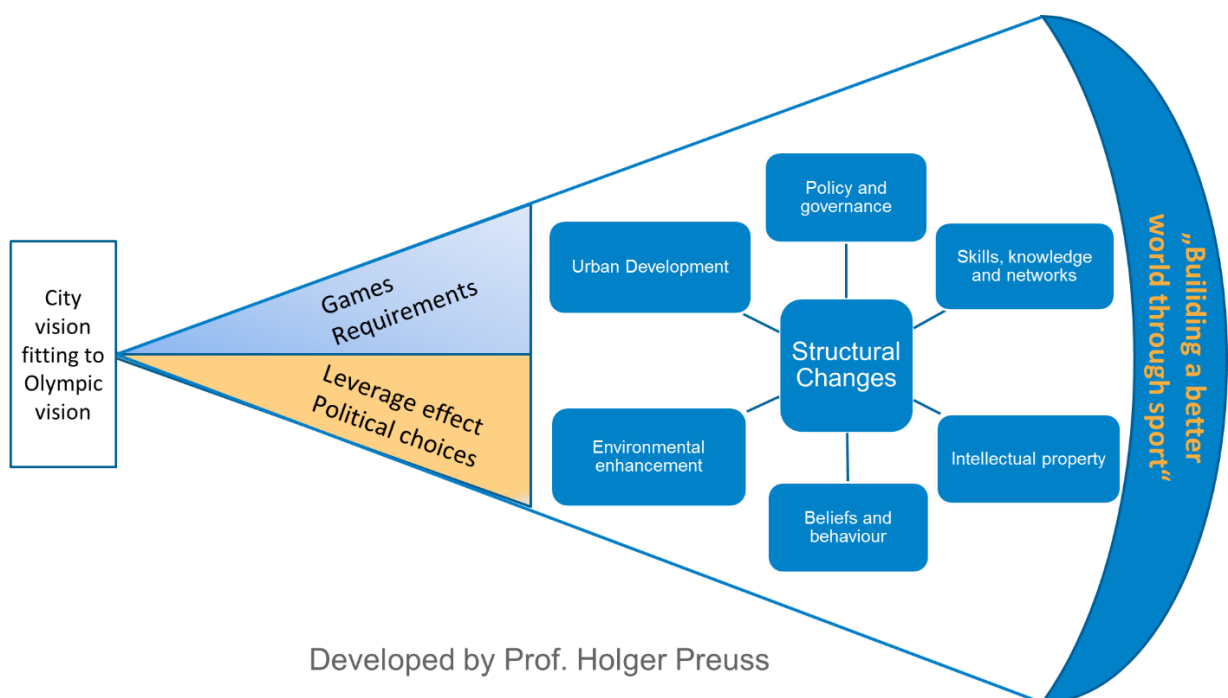


Figure 1: Legacy analytical scheme

The legacy analytical scheme starts with the city's vision, which has to comply with the Olympic vision. The vision is the focal point for the Olympic Games planning process.

Each activity initiated for the Olympic Games must go along with the vision. The vision must fit with the Olympic brand but may contain legacies that are in the interests of the host city. If both visions fit together, the city will not create structures that are needed only for the Games and not in the aftermath. The vision should be designed by the host city in consultation with the IOC. The vision should meet the expectations of the (local) society, which is why the population should be part of the visualization process. The NOC and the national government should also be involved.

Once the Olympic Games are awarded to a city, the city and the OCOG start to make structural changes. A structural change can include infrastructure, but also intangible structures (such as up-skilling or networking). There are different “drivers” that initiate the changes. Direct drivers are all the changes in the city that are required to stage the Olympic Games, for instance building sporting venues, athlete accommodation or transportation networks. Indirect drivers are all changes that are undertaken to maximize the planned legacies associated with the delivery of the event (leveraging effect). Finally, there are external drivers. These include all the changes a city undertakes, which are part of the city’s vision but are not requirements to stage the Olympic Games. They often incorporate the political choice to use the Olympic Games as an engine for urban development or to please society by means of extra projects. All external drivers are political choices.

The structural changes that occur for and by the Games can be assigned to six different facets of legacy: urban development, environmental enhancement, policy and governance, skills knowledge and networks, intellectual property, beliefs and behavior.

- 1) Urban development: e.g. road constructions, public transportation, new or renovated buildings and hotels, sporting venues, airport constructions etc.
- 2) Environmental enhancement: e.g. wastewater treatment, sewage treatment, renewable energies, water efficiency, eco-friendly buildings and venues, revitalization of destroyed biotopes etc.
- 3) Policy and governance: new policies and governance systems/mechanisms.
- 4) Skills, knowledge and networks: skills acquired through bidding for and hosting the event (hard and soft skills), knowledge created or shared (e.g. how to organize a sports mega-event), new networks developed through being part of the event.
- 5) Intellectual property: intellectual properties leading to innovation or added brand value, inventions made for or because of the Olympic Games.

- 6) Beliefs and behavior: new or changed beliefs, for instance regarding the image of a country; behavioral changes, for instance in terms of service quality, use of public transportation, sport participation.

With this analytical scheme, it is possible to structure the legacy process from planning to measuring. The aim, and therefore the guide for judging structural changes, is that the changes should result in “a better world through sport”.

3 Method

Generally, systematic reviews are important in identifying trends, summarising findings, and setting directions for future research agendas. Systematic reviews involve three key activities: 1) identifying and describing the relevant literature, 2) critically appraising the literature in a systematic manner, and 3) bringing the findings together in a coherent statement, known as a synthesis (Gough, Oliver & Thames, 2012).

This systematic review on Olympic legacy was conducted in accordance with PRISMA (Preferred Reporting Items for Systematic Reviews Meta-Analyses) guidelines (Moher, Liberati, Tetzlaff & Altman, 2009). The aim of these guidelines is to help authors to improve the reporting of systematic reviews.

The questions that guided the review are given below in full:

- 1) Which legacies of the Olympic Games can be determined?
- 2) Which methods are used to measure legacy and how appropriate and reliable are they?

3.1 Article selection

The search strategy was a mixture of a bottom-up and a top-down approach. The initial search was guided by two bibliography lists from the Olympic Studies Centre. These lists provided an important but not an exhaustive overview of legacy and impact studies. When reviewing the studies from the lists, the reference list of each of these articles was scanned for further significant sources. Grey literature was also added¹. This top-down research resulted in 304 sources.

¹ This includes reports, working papers, background papers, discussion papers, conference papers, conference presentations, theses and archival material retrieved from the Olympic Studies Centre in Lausanne, where the author spent three days.

To supplement these sources, the Web of Science academic database was searched. This database was chosen since it is a multidisciplinary database with over 90 million records. Variants of the following search terms were used: “sport mega event”, “mega sporting event” “Olympics”, “Olympic Games” combined with (“and”) “legacy”, “legacies”, “impact”, “leverage” and “leveraging”. The database search added 667 articles. Altogether, the search process yielded 843 articles² after duplicates were removed. The results of the search are shown in figure 2.

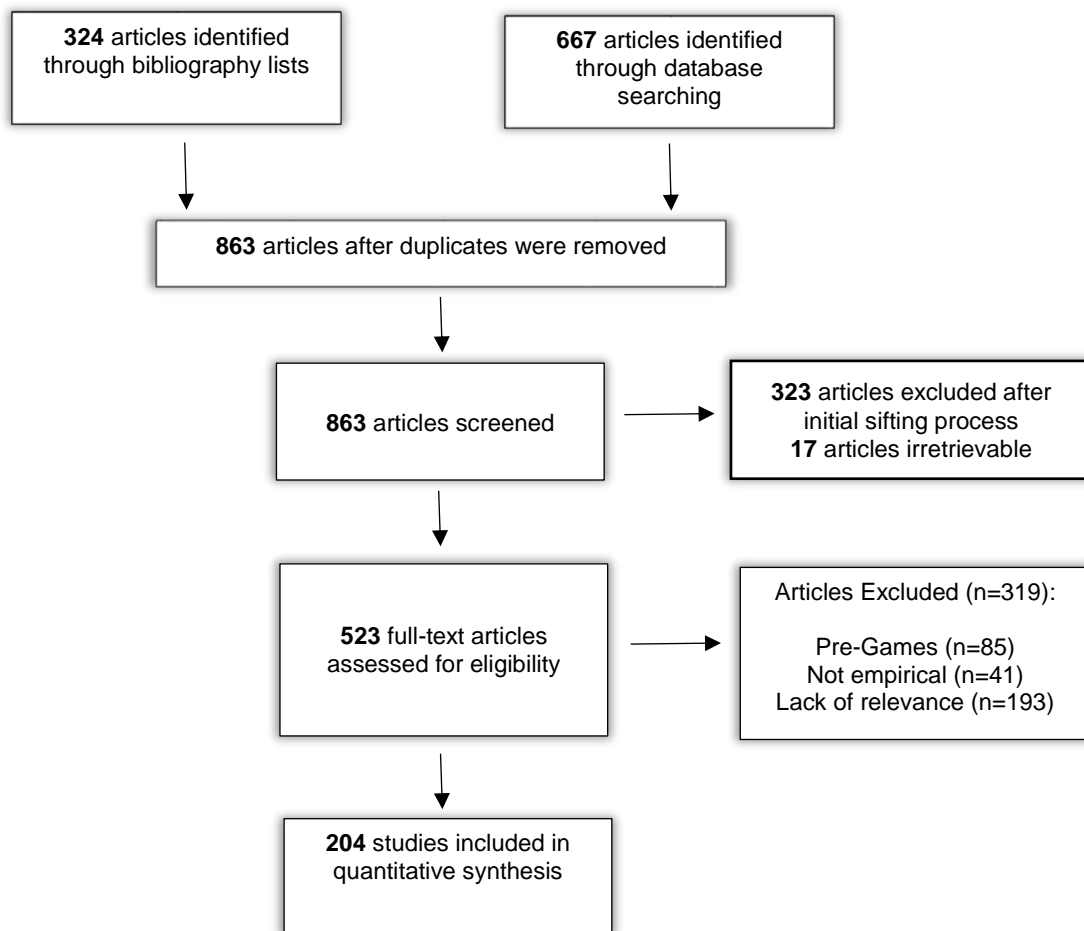


Figure 2: Search strategy of the systematic review on Olympic legacy (following Moher et al., 2009)

In a next step the 863 articles were screened and articles that were not relevant for the purpose of the review were excluded, for instance articles that do not deal with Olympic

² Including (peer-reviewed) journal articles, book chapters and book contributions from academic books, online articles and grey literature (for definition see above). Media articles were not included.

legacy. Seventeen articles had to be excluded since they were irretrievable. The remaining 523 articles were screened in more depth to assess their eligibility. To do so, exclusion criteria were developed to reduce the amount of articles iteratively. The exclusion criteria were as follows: 1) articles published pre-Games or using data from the pre-Games phase³, 2) articles that were not empirical and therefore too homogeneous to be synthesized together (e.g. commentary papers describing the same legacy or commentary papers that only reviewed literature which was also part of the analysis), and 3) articles not relevant to the study because they did not examine legacy as defined (e.g. articles dealing with short-term impacts). Following these criteria, 319 articles were excluded. Finally, 204 articles related to the review questions were included in the synthesis.

3.2 Analysis

To describe the findings of the articles a content analysis with regard to the review questions was conducted. A mixture of line-by-line and open coding was used to identify relevant facets of each article. Through this process, a preliminary framework for later analysis was built. Additionally, the methodology of each article was reviewed to identify the measurement of legacy used. After the relevant content of each article was identified, a narrative synthesis was conducted. The synthesis aimed to consider those aspects of legacies which related to the facets of the legacy analytical scheme, the measurement of legacy and causality.

3.3 Limitations

This systematic review provides new insight into the structure of the literature on Olympic legacy. Despite the potential contributions of the analysis, some limitations should be acknowledged.

First, only sources published in the English language were included; thus, sources published in other languages were not considered. Traditionally, there are many publications in the language of the country where the Olympic Games were hosted, which were excluded from this review.

³ Articles referring to a particular Games edition that were published before the Games were held were critically appraised and only included if structural changes had actually happened in the pre-Games phase.

Second, the article selection was done by only one researcher. Consequently, other researchers might have included or excluded other articles, since this is a subjective process.

Lastly, the quality of the studies included varies. Many articles were published in peer-reviewed journals, thus a certain quality check was done. Other studies, which were published for instance as a working paper or a report, did not benefit from this quality check. However, studies with severe methodological issues were excluded right from the beginning. Other issues, e.g. small sample size, were addressed directly in the synthesis.

4 Results

4.1 General results

4.1.1 Games editions

To examine trends by Games edition, the articles were grouped by the Games edition to which they refer. The results reflect the trend towards increasing attention to Games legacies (see figure 3). The analysis includes 11 articles examining the issue of legacy for the Games from 1908 to 1968, 65 articles from 1972 to 1998 and 129 articles from 2000 to 2016, including 32 articles for the 2012 London Games⁴. 71% of the articles examined Olympic Summer Games; thus, 29% address the legacy of Olympic Winter Games. Articles that were grouped in the “general” category do not refer to any specific Games edition but deal with the concept of legacy in a conceptual manner.

⁴ The number is greater than the number of articles included in the analysis, due to the inclusion of overview articles, which cover several Games together. Articles that deal with, for instance, three Games editions were counted three times, once for each Games edition.

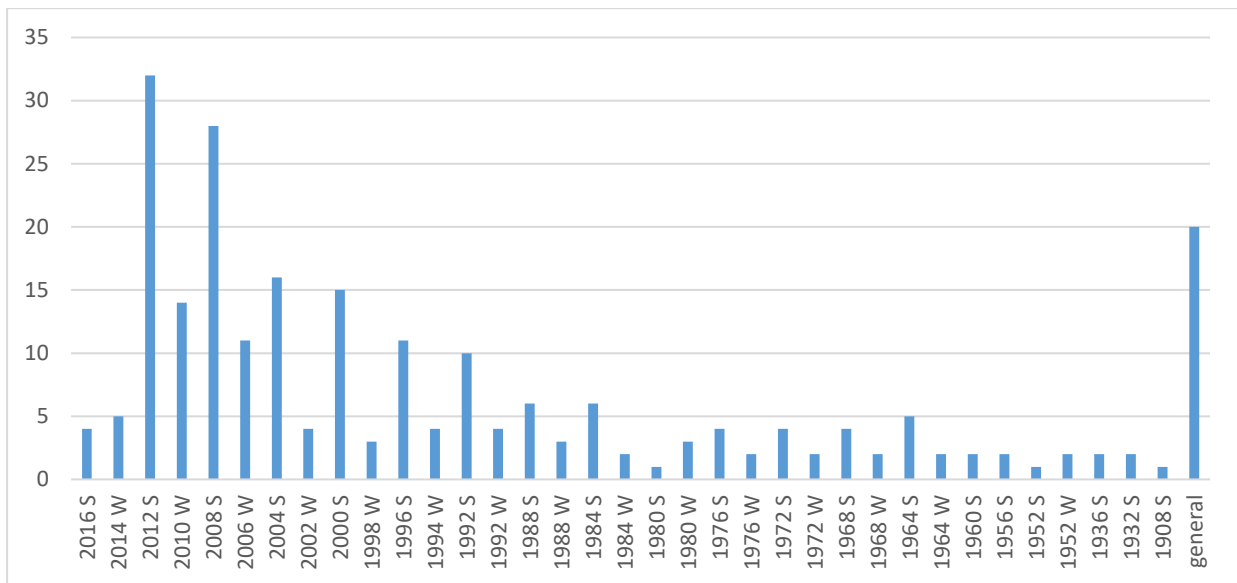


Figure 3: Number of articles for each Games edition

The increasing focus on legacy can also be shown by the figures of the initial search process, before the iterative process of exclusion was conducted. Many studies had to be excluded since they did not meet the requirements for this review. However, they did deal with the concept of legacy in another way. The numbers of articles for all sources identified are as follows: 65 articles for 1896 to 1968, 381 articles for 1972 to 1998 and 417 articles for 2000 to 2016, including 153 articles for the London Games, deal with legacy in some manner.

4.1.2 Methods used to study Olympic Games legacy

Conceptual or commentary-type studies represent the largest percentage of articles analyzed (39%). Most of these papers describe legacies in a narrative way but do not draw on empirical figures. Other articles in this category attempt to investigate the concept of legacy theoretically. The other major category of articles analyzed are empirical in nature. Most of the studies take a qualitative approach (21%), primarily using some form of interview. The other major category of empirical studies used surveys (17%). The complete results are shown in figure 4.

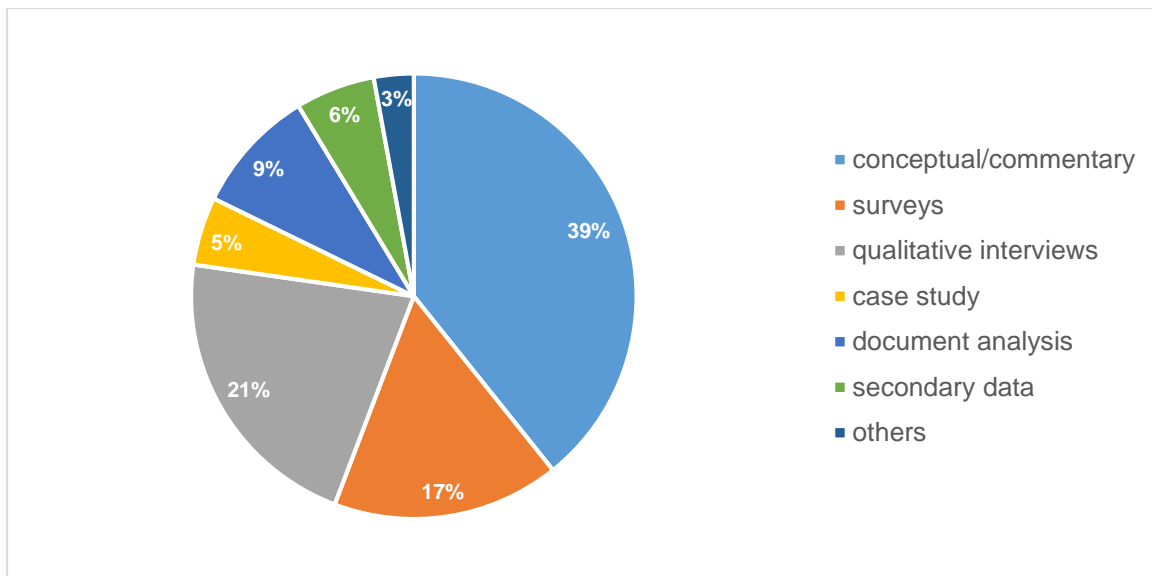


Figure 4: Research methods

4.1.3 Analysis of article contents and facets of legacy

The analysis shows how often each facet of legacy is addressed by any of the articles. The facet of urban development was researched most often (96x) followed by beliefs and behavior (72x). Legacies belonging to the facet of skills, knowledge and networks were studied 39 times. Intellectual property legacy was addressed only nine times.

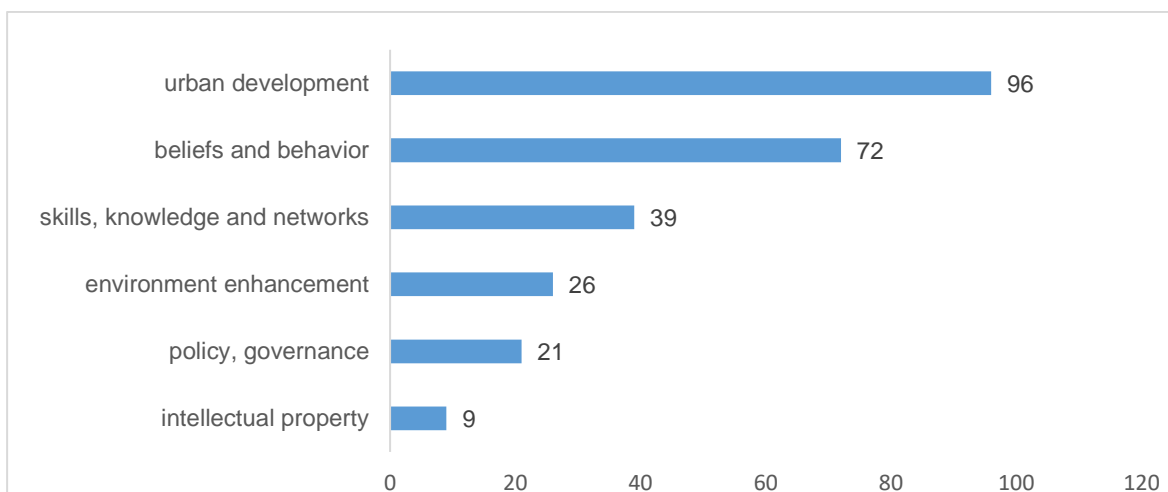


Figure 5: Legacies identified in studies attributed to legacy aspects

4.1.4 Analysis of facets for each Games edition

The tables in annex 1 show which facets of legacy were investigated for each Olympic Games edition. The analysis showed that the aspect of urban development was addressed by studies for almost all Games editions. This is mainly due to the presence of “overview articles” for both Summer Olympic Games and Winter Olympic Games.

They outline structural changes in terms of urban development for almost every host city. However, most articles often only describe changes to urban infrastructure, such as new roads constructed or new (sporting) venues built, but the value of the changed infrastructure remains unclear. Questions like how frequented the road is or how often the sporting venue is used are not addressed, or only answered in a narrative way, and not measured by objective indicators.

The tables in annex 1 show that there are only two Games editions for which all facets of legacy have been researched: London 2012 and Vancouver 2010. The earlier the Games, the less legacy information has been investigated.

4.1.5 Results from systematic reviews and long-term studies

This section provides an overview of systematic reviews or studies, which are based on data from several Games to make general assumptions or conclusions.

The review by Weed et al. (2015) focuses on increasing sport participation through Olympic Games, and whether there is a demonstration effect. The worldwide systematic review of English language sources included 21 papers. As a result, they state that there is no evidence for an inherent demonstration effect. The results suggest that

“effectively leveraging a demonstration effect (in which people are inspired by elite sport, sports people and sport events to participate themselves) in the pre-Games pregnancy period may have the potential to increase participation frequency in sport, and perhaps to re-engage lapsed participants. The evidence also suggests that relying on an inherent demonstration effect to bring new participants into sport is not likely to be successful.” (Weed et al., 2015, p. 220).

Another systematic review conducted by Mahtani et al. (2013) found, similarly, that it is difficult to establish a clear relationship between staging the Olympic Games and increased physical activity. Generally, “inherent legacies” for raising physical activity levels do not exist.

McCartney et al. (2010) investigate both socioeconomic effects and health legacy themes for sports mega-events between 1978 and 2008. Their review included 54 studies, but they noticed that study quality was poor (e.g. because of a lack of comparison group). As a result, they found that “there is little or no evidence that major multi-sport events held between 1978 and 2008 had positive health impacts on the populations of cities that hosted these events” (McCartney, 2010, p. 1229).

Besides these two reviews, which focus on particular legacy themes, there are studies that use data collected over a long period to examine economic effects. The literature on the effects of international trade and FDI on economic growth is sizeable. However,

most of the studies had to be excluded from this legacy review since they did not analyze the impacts in the years after hosting the Games, and thus the real legacy. Furthermore, there are some methodological issues for these kinds of studies. Nevertheless, some of the studies will be reviewed in this section in order to give a full picture of the literature.

Many studies try to assess impacts on GDP, exports, real estate or tourism in a country (e.g. Berman, Brooks & Davidson, 2010; Demir, Eliöz, Cebi & Yamak, 2015; Demir, Eliöz, Cebi, Cekin & Yamak, 2015; Kontokosta, 2012; Li & McCabe, 2013; Veraros, Nikolaos, Kasimati, Evangelia & Dawson, 2004). However, these studies did not reach a clear consensus. One reason for this is that Olympic Games are hosted by large open economies, and because of this, the economic impact of hosting the Games is too small relative to the national economy to be picked up in broad national indicators, GDP or by the stock market. Billings and Holladay (2012), for instance, examined whether hosting the Olympic Games improves a city's long-term growth. They used a difference-in-difference approach for host cities between 1950 and 2005. The results showed no long-term impacts of hosting an Olympic Games on the real Gross Domestic Product per capita or on trade openness.

Rose and Spiegel (2011) investigated "The Olympic Effect" and showed that countries that had hosted Olympic Games seemed to have exports over 20% higher. They examined bilateral trade flows between a pair of countries as a function of the distance between the two countries and their economic "masses". However, the reliability of the results must be questioned. The sample is not representative, since they compare nations such as the US, Japan, Germany etc., which have been among the leading export nations for centuries, with all other nations.

Somerville and Wetzel (2010) tried to overcome this obstacle by using house prices. They examined whether hosting the Olympic Games had an impact on housing markets, and if there was any evidence of an Olympic "bounce" through an increase in house prices. They found none. They argue that

"changes in house prices are an effective tool to identify benefits unique to a particular location because they have been shown to monetize an area's enhanced future economic opportunities from expected increases in employment opportunities, wages, and higher local business earnings. Critically, they will also rise from any increased quality of life that results from Olympic infrastructure spending and legacy facilities" (Somerville & Wetzel, 2010, p. 2)

However, they also mention one disadvantage of this approach. They argue that the allocation of costs is the outcome of a political rather than an economic process. If the state or local government picks up a disproportionately large part of Games-related expenses, the allocation of costs between local, state, and national levels will not reflect the distribution of the benefits of the Games. As a result, the estimated Olympic effect would appear to be more positive than it really is (Somerville & Wetzel, 2010).

4.2 Conceptualization of Olympic Games legacies

The following section provides the narrative synthesis for each Games edition. The results are structured as described below. First, a general overview is given by pointing out which kinds of articles were analyzed and which topics were predominantly covered in the literature. In this first section, the methods used for the studies are also evaluated. Second, the legacies of the articles are synthesized and attributed to the facets of legacy from the analytical scheme.

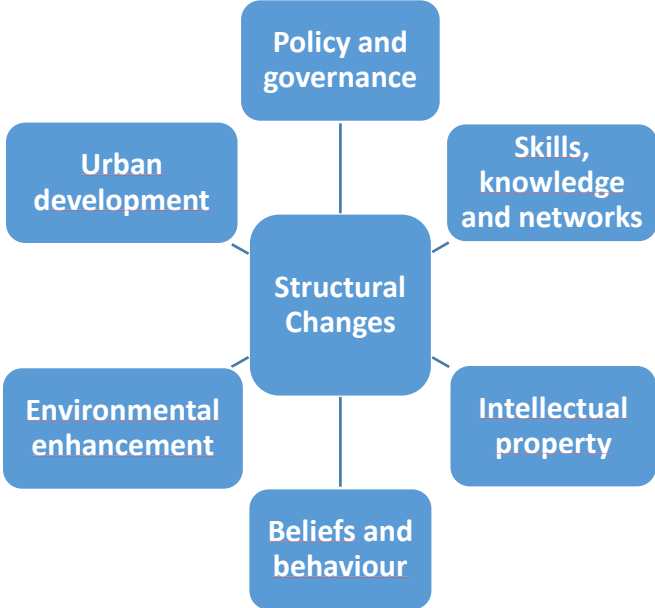


Figure 6: Facets of legacy

The analytical scheme represents six facets of structural change. The legacies identified in the literature were translated into these six fields. Within this synthesis, it was also assessed how reliable the results were, and if the causality between the Olympic Games and the examined legacies had been explained.

4.2.1 Summer Olympic Games

4.2.1.1 *Rio de Janeiro 2016*

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

For the analysis of the articles regarding the legacies of the Rio 2016 Olympic Games, only four articles could be included in the analysis. Overall, 33 articles dealing with the Rio Games and legacy were identified; however, almost all of them were published prior to the Games, and thus no legacy as defined for this review was investigated. The studies included in the analysis are empirical except for one. Two empirical articles address the transport legacy. Although these articles are based on research that was conducted in the run-up to the Games, they were included in the analysis since they deal with the new infrastructure built for the Games. These structural changes had already been created as a legacy of the Games. Of course, it is not possible to fully evaluate the legacy of the BRT network with data that were collected prior to the Games, however the results of the two studies are considered important for this review. In particular, the article by Kassens-Noor, Gaffney, Messina & Phillips (2016) is considered a reliable and valid source, since it is based on triangulation of in-depth interviews, spatial analysis of socioeconomic factors, content analysis of policy documents and field work along the routes of newly developed BRT lines.

One other article refers to public security. Four facets of legacy are covered in two different industries: city development and security.

URBAN DEVELOPMENT

The BRT bus corridors were one of the main innovations of the Games to improve public transport. The number of BRT corridors was expanded from three (totaling 72km) to four (totaling 154km). For the BRT network, several measures were taken to improve the quality of service, road safety and personal security (Lindau, Petzhold, Tavares & Facchini, 2016). The creation of the BRT network was very cost-effective but it brought several problems (Kassens-Noor, Gaffney, Messina & Phillips, 2016). The BRTs fail to meet congestion reduction targets and have imposed significant burdens on the urban poor. Media coverage of the BRT systems documents overcrowding and safety worries as routine occurrences (Silvestre, 2017). “The BRT planning process produced unjust outcomes on account of a process oriented toward benefiting the Olympic coalition at the expense of the public interest” (ibid, p. 9). BRTs hinder

social connectivity due to the fragmentation of physical and social space and consequent disintegration of local communities. The BRT also reduced the number of bicycles and hand carts along the Transcarioca (which cuts through the North End towards the international airport). Safe crossings are lacking, which has caused dozens of deaths and hundreds of injuries along the Transoeste (linking Barra to the West End) (ibid).

Besides the BRT extensions, a 28km LRT system serving the city center was added, as well as a 16km extension of a metro line. The city's bike paths were expanded from 150km to 450km (Lindau, Petzhold, Tavares & Facchini, 2016). In Silvestre's (2017, p. 417) view: "The new BRT corridors and the expanded metro network will significantly improve transport connections in the region of Barra, but substantially improved services for the commuters based in the North and Baixada Fluminense areas – the latter responsible for a flow of two million passengers daily to Rio [...] – will have to wait for the time being."

ENVIRONMENT ENHANCEMENT

Through renewal of the bus fleet, emissions were reduced. For the BRT network, Rio received the 2015 Sustainable Transport Award, "which recognizes cities for significant efforts to improve mobility, reduce greenhouse gas emissions, and ensure safety and access for pedestrians and cyclists to public spaces" (Lindau et al., 2016, p. 202). However, Kassens-Noor et al. (2016) assert that the fully operational BRT line will impose burdens on protected land since, for instance, 23% of the Transoeste runs through wetlands and forests. This will lead to loss of plant and wildlife in the nationally protected Tijuca forest.

Another legacy that could already be assessed before the Games was the loss of natural environment through the construction of the Olympic golf course. The golf course was built in an area previously protected as a natural site (Silvestre, 2017).

POLICY AND GOVERNANCE

Rekow (2016) examined the "Games Security Plan" which was launched as one of the greatest legacies of the Olympic Games. However, Rekow (2016) concluded that peace and public security were not restored, and the promised legacy of a safe city for the Games was not delivered.

BELIEFS

A survey among BRT users revealed that the BRT accounts for an average daily time saving per capita of 31.8 minutes (Lindau et al., 2016). Furthermore, overall satisfaction increased 3.4 times. Respondents ranked the attributes of travel time, reliability and access to the system most highly. Although some problems remained, such as terminal/stations and vehicle overloading problems, 75% of users believe that services will be improved once the full BRT network is operational (ibid).

4.2.1.2 London 2012

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis for the 2012 London Olympic Games includes 13 empirical articles and 19 articles that were conceptual or commentary. The majority of articles focus on the sport participation legacy (22%), followed by articles dealing with urban regeneration (16%). Further articles deal with the legacies of the Cultural Olympiad, transport and tourism, or provide an overview of all legacies (e.g. ESRC, 2015; DCMS, 2013). The articles address six facets of legacy in the following industries: sport, city development, tourism, housing, culture, environment and health.

The initial search process revealed 153 sources dealing with the London Games and legacy. However, most of the studies had to be excluded since they did not meet the criteria for the review. Many studies were published prior to the Games. Another major proportion examined legacy but not in a way that would enrich this review. Such articles dealt, for instance, with legacy planning, governance of legacy, the rhetoric of legacy and the implementation of policies which could serve as a basis for legacies etc. Consequently, these studies were not relevant to the purposes of this review, and the number of studies that measured legacy (or at least tried to) was significantly lower. Despite this reduction, 32 articles were synthesized for this review. Some of the articles give a very detailed picture of the London legacies, which meant it was not possible to keep to this level of detail.

Many articles dealing with the London legacy are public documents. These sources must be evaluated carefully, since they often feature as marketing tools rather than providing findings from objective research (McGuinness, 2014). Legacy is often used as a discursive political tool to justify public money spend. This seems to be at least the case for the post-Games evaluation report on the impacts and legacy of London 2012

by the DCMS (ibid). Furthermore, these public documents often make very vague assertions, for instance: “We *believe* that these arrangements *will have an impact* on the extent to which the UK is able to secure the maximum possible legacy from the Games” (House of Lords, 2013, p. 88) or “... the Games had helped to improve public perceptions of volunteering, and that *this might have a positive impact* on the willingness of individuals to come forward as volunteers” (ibid, p. 84). Such statements were not included in the subsequent synthesis since they are only assumptions, and are neither objective nor valid.

Many findings draw from the post-Games report of the Olympic Games Impact Study by the Economic & Social Research Council (ESRC). The report presents 67 indicators; however, not all indicators proved suitable for this review (e.g. indicators belonging directly to the event). The indicators were built from accessible secondary data since no primary (survey) data collection was feasible within the available study period and budget. The report tries to assess the impact for the period 2003-2015, but there was not a consistent time series for all studies.

URBAN DEVELOPMENT

The 226 hectare Olympic Park provides many facilities for Londoners, including two primary schools, one secondary school, nine nurseries, three health centers, and a number of multi-purpose community, leisure and cultural spaces. Furthermore, 80,000 square meters of business space as well as 100 hectares of green space were created (Daothong, & Stubbs, 2014; DCMS, 2013). The renamed Queen Elizabeth Olympic Park is well used by the public and provides enhanced recreation and leisure activities in this part of London (ESRC, 2015). Further legacies can be reported for another key Olympic venue at Weymouth and Portland. The venue benefited from enhanced natural conservation status, increased capacity for tourism and infrastructure improvements (ESRC, 2015).

The area of East London has undergone a massive change in accessibility and in transport facilities from the Docklands Light Rail, Jubilee Line extension, Crossrail and High Speed Rail (Scott, 2014; Thornley, 2012). Additionally, Stratford station enhancements, London Overground improvements, new cycle ways and walking routes as well as highway improvements constitute the London transport legacy (Sumner, 2012). The airport received major improvements as well as new road and rail connections, and personal rapid transport (Kassens-Noor, 2013). ESRC (2015) evaluates the transport

legacy as positive and describes the rail transport infrastructure as exemplary. One other report evaluates the transport infrastructure of the Games as critical (House of Lords, 2013). To assess the real legacy of the transport infrastructure, empirical studies are mandatory.

Another part of the urban development was the investment in almost 1,500 sport facilities, including the building of six permanent venues (DCMS, 2013). The permanent venues are in secure ownership, management and popular use. Venues that are open for elite and public use are: the Stadium, the Copper Box, the London Aquatics Centre, the Lee Valley Velopark, the Lee Valley Hockey and Tennis Centre, Lee Valley White Water center, the Hadleigh Farm Mountain Bike course, and Dorney Lake regatta center (ESRC, 2015).

In terms of housing, studies provide mixed results, depending on the stakeholder perspective. On the one hand, numerous new homes were built. The Olympic Park has nearly 10,000 new homes. However, 1,000 planned homes were cut from the revised legacy plan (Evans & Edizel, 2017). The long-term development will see 24,000 new homes built by 2030, a significant proportion (35%) of which are pledged to be affordable. This target has been reduced in the case of the neighborhood of Chobham Manor to 30% (from 40% target) (ibid). The Athletes' Village provides 49% affordable housing, including accessible and family housing (Bernstock, 2013; DCMS, 2013). On the other hand, the Olympic housing legacy is limited for existing working-class East Londoners, since affordable housing and community facilities that benefited lower-income East Londoners were removed for the Games facilities (Watt, 2013). These claims are in line with Bernstock (2013), who evaluated the housing legacy for East London as being negative, since new housing in the East Village units does not compensate for the housing lost through other projects. The lessons of London suggest that "mega events are not the most appropriate vehicle for meeting the housing needs of low-income families" (Bernstock, 2013, p. 169). She further asserts that the high level of affordable housing was a result of market failure, not of planning agreements.

To deliver a cultural legacy, an Olympic Park cultural legacy strategy was developed. However, there is no empirical evidence for the projected vision that local communities would benefit from the Games. Opportunities for the local creative industry were missed and a gap between Olympic rhetoric and local reality can be seen (Pappalopore & Duignan, 2016).

A critical view of the London legacy is provided by Poynter, a researcher from the University of East London. He comments that “East London got a stadium it didn’t need, more four- and five-star hotels it didn’t need, and additional high-rise, high priced developments it didn’t need” (Zimbalist, 2015, p. 116). Generally, it is still difficult to assess the true physical transformation legacy since, it will not be fully realized for a number of years (DCMS, 2013).

The question of causality is addressed by three authors (Thornley, 2012; Weed, 2014; Zimbalist, 2015). Thornley and Zimbalist make it clear that the transformation plan for East London was in place well before the announcement that the Games had been awarded to London. A regenerative dynamic in favor of developing East London had already begun in the 1990s. Consequently, the Olympic Games made only a minor contribution to urban regeneration, although they did serve as an accelerator. Weed (2014) analyzed the regeneration legacy by using program theory (see chapter 6) and focusing on questions of attribution and additionality (see chapter 5). He concludes that there is clear evidence that the London 2012 legacy strategy led to significant outcomes in terms of the regeneration of East London.

ENVIRONMENT ENHANCEMENT

The London 2012 sustainability program accounts for a number of environmental legacies. Through the promotion of sustainability good practice around the Games, a legacy was created. In terms of water efficiency, high levels of water saving were achieved through several installations and new standards (Daothong & Stubbs, 2014). The Old Ford Water Recycling Plant is a wastewater treatment facility built for the Games. The plant provides recycled water to the venues and infrastructure in the Park for non-potable use (ESRC, 2015).

Another part of London’s legacy comes from the regeneration and restoration of the waterway network. “The waterways improve the quality of the environment through creation and protection of bio-diverse habitats, are a local asset, which helps to define ‘place’, and they act as a further catalyst for regeneration” (Nicholls, 2014, p. 45). Furthermore, a sustainable flood risk management was established to reduce flood risk, thus improving the quality of life for thousands of east London residents. Improved water quality, habitat creation and biodiversity should also be mentioned (ESRC, 2015; Palmer, Ker-Reid, Venn & Bruni, 2014). However, in terms of water quality, the results

have been modest and more needs to be done to deal with the urban runoff that feeds into the River Lee (ESRC, 2015).

There are some measures and legacies that it is difficult to attribute to the Games. For instance, the OGI post-Games report lists the Closed Loop PET recycling plant as part of an inventory of new waste and wastewater treatment facilities built for the Games (ESRC, 2015, p. 45). Yet, the report continues

“The Closed Loop PET Recycling plant was the first polyethylene terephthalate recycling plant to be built in the UK. This is not linked to the London 2012 Games but represents a wider opportunity for PET recycling in London and the South East” (ESRC, 2015, p. 46).

Thus it is not clear whether the plant would have been built without the Games, and if it is a legacy of the Games or not.

POLICY AND GOVERNANCE

There is evidence of sustainable food policies from the London 2012 Games, which have also been adopted by many other events. One example of the London food legacy is the “sustainable fish city”. This initiative ensures that people eat only fish that is demonstrably sustainable (Daothong & Stubbs, 2014).

To meet packaging requirements for the Games, companies had to adjust their product packing. After the Games, the companies continued to use these measures across their businesses, resulting in a waste legacy (Daothong & Stubbs, 2014).

SKILLS, KNOWLEDGE AND NETWORKS

There is clear evidence that the Games helped organizations to develop new skills, partnerships, approaches and strategies (House of Lords, 2013; Gilmore, 2014). Moreover, significant legacy outcomes in terms of enhanced business capacity were realized (Weed, 2014). Changes in working practices by London businesses led to flexible working practices, increasing productivity, and these are now being taken forward and used after the Games (DCMS, 2013).

A study intended to evaluate the impact and legacy of pharmacists’ professional development shows that respondents drew on significant benefits from working for the Games, in terms of close collaboration with pharmacy colleagues, Olympic and Paralympic team doctors and other healthcare professionals (File, Mottram, Stuart & Thomas, 2015). However, the study was conducted just one year after the Games and so it remains unclear whether this will result in a real legacy, or if it is just a short-term impact.

Around 10,000 permanent jobs were created to operate the Westfield Stratford City shopping center. It is estimated that about one in every three jobs would not have been created without the London Games (DCMS, 2013).

For the London 2012 Games, knowledge was developed in many areas. Through the dissemination of learning, methods and tools, a smooth transfer of knowledge was achieved. The “learning legacy” initiative can be seen as a legacy from the London Games, but also for the Olympic movement. This initiative provides an archive of reports, case studies and research papers to share all the London 2012 knowledge and communicate the lessons learned (Daothong & Stubbs, 2014; ESRC, 2015).

A real achievement of the Games was the development of the expertise, international standing and self-confidence to bid for and host future major sporting events. This is underlined by the record of successful bids for major events over the following years, which is already impressive (ESRC, 2015; House of Lords, 2013). One example is the lessons from London’s security planning, which were transferred to preparations for other sport events in Britain like the 2014 Commonwealth Games (Coaffee, 2015).

INTELLECTUAL PROPERTY

The London 2012 Games developed the new ISO 20121 standard which helps organizations in the events industry to improve the sustainability of their event-related activities, products and services. It has been adopted widely across the world (e.g. the Milan 2015 and Dubai 2020 World Fairs, Glasgow 2014 Commonwealth Games) (Daothong & Stubbs, 2014; ESRC, 2015). London 2012 also pioneered new methodologies for measuring the carbon dioxide footprint of mega-events (ibid).

LOCOG further introduced a comprehensive Sustainable Sourcing Code, which was applied across all major supply, licensing and domestic sponsorship deals. It was complemented by an innovative Complaints and Dispute Resolution Mechanism, an approach subsequently adopted by Adidas, while many other elements of the Code have been taken forward by future Olympic organizing committees and large corporations (ESRC, 2015).

BELIEFS

It can be assumed that the Games contributed to an improved image of Britain, since the country moved up one position after the Games to fourth place in the Nations Brand Index (DCMS, 2013). The Olympic Games also helped to change the general image of East London (Thornley, 2012).

London residents have different attitudes towards the Games and their legacies. One survey undertaken with young people reveals that 84% of respondents believe that the Olympic Games have made a positive difference to the UK. Furthermore, 61% agreed that the Games inspired them to aim higher and work harder, and so transformed their lives (DCMS, 2013). The Host Borough Survey revealed that Newham residents were quite positive towards the Games and its legacies. The regeneration process triggered by the Games was a main driver for 42% of respondents to move into the area (Evans & Edizel, 2017).

Other people have a rather negative perception of the Games and their legacies. Lower-income residents in particular do not feel any benefits from hosting the Games (Watt, 2013). Another survey among host borough residents revealed that respondents did not believe that hosting the Games contributed to community spirit (Evans & Edizel, 2017).

Again, it is important to consider the time perspective, since these articles (except for Evans & Edizel, 2017) were published shortly after the Games, and thus are not appropriate for judging the legacy.

BEHAVIOR

Increasing physical activity was one of the major goals for the London Games. Several articles deal with increasing sport participation, but all studies (except for one) are sourced principally from two national surveys, the Active People Survey (APS) and the Taking Part Survey (TPS). However, the data has been subject to criticism on a number of counts, and there are a number of limitations due to the methodology of these studies. Both surveys are cross-sectional rather than longitudinal. Hence it is not possible to trace changes in individual patterns of behavior (Henry, 2016). Further limitations result from the method of data collection, the size of local samples and the lack of data relating to the younger population, which were a priority target group (House of Lords, 2013, Henry, 2016). The comparability of the two studies is also limited because

of different questions, sampling and interviewing strategies (Henry, 2016). Consequently, the data does not provide a valid and reliable basis for measuring a participation legacy. This is also shown by the different results of the articles, although the articles rely on the same sources. The meta-evaluation of the Impacts and Legacy of the London 2012 Olympic and Paralympic Games states that both studies point to increases in the percentage of adults participating in sport in the immediate aftermath of the Games (DCMS, 2013). Other articles, however, interpret the data more critically and find no evidence for a significant surge in participation levels up to 2011 across the population as a whole (House of Lords, 2013; ESRC, 2015; Henry, 2016). From October 2012 to March 2015 APS data even shows a falling-off of participation (Henry, 2016). These results are also underlined by a qualitative study that revealed that watching Olympic athletes compete was unlikely to inspire participation among inactive people. There could even be negative effects, due to people being discouraged by the perceived competence gap (Carter & Lorenc, 2015). The House of Lords Select Committee concluded that:

“The UK faces an epidemic of obesity and the promise of inspiring a new sporting generation was a crucial and tantalising part of the legacy aspiration. A post-Games step change in participation across the UK and across different sports did not materialize” (House of Lords 2013, p. 5)

As well as looking at the APS and TPS, Pappous and Hayday (2015) examined participation in fencing and judo in the host country. By analyzing membership rates for these associations, an overall increase in participation between 2007 and 2013, in both fencing and judo, was observed. They also state that both sports developed and implemented community-based programs during the “pregnancy period”. It could be proposed that the increase in participation was a result of the marketing and promotion of the programs, rather than solely the inspirational effect of hosting the Olympic Games. Müther, Williamson & Williamson (2014) investigated the impact of the London Games on the physical activity of rheumatology patients, and revealed a seven percent increase in the amount of exercise they took in response to the Games. Thus, only a small minority of patients increased the amount they exercised. The results of sports clubs for people with disabilities were similar. After the Paralympic Games, 89% of sports clubs saw no change in their membership figures (Scott, 2014).

Another legacy goal was to inspire a generation and to increase opportunities for children to access sport and physical activity. However, programs which facilitated the funding of school sports, like the School Sports Partnerships, were terminated in the

run-up to the Games, and an alternative program which could deliver significant increases in participation in school sport was needed. As a result, new funding in the form of a Sport Premium was provided, but the legacy is a little less certain. According to the House of Commons Education Committee (2013) the Sport Premium is inadequate and not sufficient to allow a longer term provision to be built.

Aside from the question of whether there was any evidence of a sport participation legacy, the attribution of such legacies to Games programs and interventions is also controversial. DCMS (2013) states that sport participation is impacted by a range of factors. The Games contributed to the increase in sport participation through investments in almost 1,500 facilities, sport programs and their motivation for people. However, TPS shows that only 12.0% of adults who were already participating in sport said that they had been motivated to do more sport by the UK winning the bid to host the Games. 3.3% of adults who did not participate in sport said that they had become more interested in sport by the UK winning the bid. These figures show that they did not measure how Games interventions influenced sport participation, given that the survey figures only asked for motivation or planned behaviour, not actual changes in behavior. Consequently, questions of how far changes in sport participation are attributable to the Games remain.

“There are some areas, such as sport participation, where what is being claimed as legacy is neither attributable to legacy strategy nor additional or distinctive as a result of an association with the Games.” (Weed, 2014, p. 123)

There is no evidence of an increased inclination in the population to volunteer from the Games. Although there were several volunteer programs, “post Games the momentum for volunteering was lost” (ESRC, 2015, p. 87). The opportunity to build upon the success of the Games has been missed, and planning for the volunteering legacy should have started much earlier (House of Lords, 2013). The House of Commons (2013) also asserts that there is no clear plan for capitalizing on the contribution volunteers can make to other volunteering initiatives.

4.2.1.3 Beijing 2008

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis for the 2008 Beijing Olympic Games includes 21 empirical articles and seven articles that were conceptual or commentary. The major topics are the image of the city and nation (36% of articles), urban development of the city, including sporting

facilities (32% of articles), and environmental changes (25% of articles). The articles address five facets of legacy in six different industries: sport, city development, tourism, housing, environment and health.

The analysis for the Beijing Games often revealed mixed results and contradictory data. For example, different results are reported for the extension of the subway lines. Aryabaha (2010) reports four new subway lines, Gratton, Preuss and Liu (2015) three new lines and Zhao, Ching, He & Chan (2016) eight new subway lines built for the Games. Although the actual number of subway lines is not crucial, this is just one example to illustrate the difficulty of synthesizing the articles for the Beijing Games. In comparison to other Games editions, many articles dealing with the 2008 Beijing Games could be found. However, there are only few articles focusing on concrete legacies, or on measuring legacies in an appropriate and reliable manner.

URBAN DEVELOPMENT

For the Olympic Games, Beijing received major improvements to its infrastructure, including new roads and highways, new subway lines (extension from 42 to 200 kilometers (Preuss, Gratton & Liu, 2015)), a light rail link to the airport and a bullet train link to Tianjin (Aryabaha, 2010; Zhao et al., 2016). The hotel capacity was expanded by building 252 new international quality hotels (Zhao et al., 2016). The newly built airport terminal increased capacity by 24 million people. However, about 10% of Beijing residents suffered from Games-driven forced evictions (deLisle, 2009).

For the Games, 36 competition venues plus 66 training sites were constructed or renovated and equipped, leaving a legacy of more and better sport infrastructure for Beijing (Gratton, Preuss & Liu, 2015). The Bird's Nest and the Water Cube were constructed and are now iconic buildings, as well as the Beijing Capital Museum, the National Grand Theatre and the New CCTV Tower (Aryabaha, 2010). However, it remains unclear how much the Bird's Nest is actually used and whether it constitutes a sustainable legacy. According to Aryabaha (2010, pp. 45-46.) "the gorgeous Beijing National Stadium is yet to find significant use beyond hosting a few events and a couple of tourists." According to He, Chen and Zhang (2010) stadiums like the Bird's Nest are so expensive that many event organisers are unable to rent them. In Zimbalist's (2015) view, the Bird's Nest is a white elephant. Giulianotti (2015) also found that the National Stadium struggles to sustain itself through regular sports or other events. In contrast, Wang and Li (2013) state that the Bird's Nest received nearly 20 million visitors during

the post-Games period up to July 2012. Over 60 large-scale events were held at the National Stadium. The Water Cube received 4.5 million visitors. However, for legacy evaluation purposes it is important to exclude the period shortly after the Games and look at current data.

Generally, the Beijing venues are used extensively for sports events, cultural activities, business, exhibitions, tourism and recreation (ibid). A more detailed evaluation of post-Games utilization of the Olympic venues is provided by Yu (2014). For the six years following the 2008 Games, post-Games utilization can be summarized as follows:

- (1) venues built on campuses were well utilized;
- (2) pre-existing venues were largely well utilized. These include the Workers' Stadium, the NOSC Stadium, the NOSC Gymnasium, the Ying Tung Natatorium, and the Lao Shan Mountain Bike Course;
- (3) multifunction venues were better utilized in general than those with a single function such as the Beijing Shooting Range Hall and Clay Target Field, and the Shun Yi Olympic Aquatic Park;
- (4) medium scale venues were better utilized than large scale ones such as the Bird's Nest and the Shun Yi Olympic Aquatic Park;
- (5) those owned by government, especially the five district governments, were underused. This applies to the Feng Tai Sport Center Softball Field, the Chao Yang Park Beach Volleyball Ground, the Olympic Tennis Court, the Ming Tomb Reservoir Triathlon Course, and the Olympic Hockey Field; and
- (6) in contrast, those owned by the universities, GASC and private enterprise largely showed better utilization conditions than their government-owned (district government) counterparts." (Yu, 2014, pp. 10-11)

Further information was retrieved from Zimbalist (2015), namely that the rowing park in the city's suburbs had fallen into disuse, and had very few visitors. Furthermore, the cycling tracks in another outlying district were reported to be covered in weeds, and the beach volleyball courts were not accessible to the public.

The Beijing Olympic Park has been in full operation since the end of the Games. The central part is open to the public, while an admission fee is charged to access the stadiums. The park attracts many tourists and has become an important tourism destination in the city (He, Chen & Zang, 2010).

For the Olympic Games many security technologies (e.g. closed-circuit television and surveillance systems) and equipment (e.g. electric scooters) were introduced, which were also used after the Games (Giulianotti, 2015)⁵.

ENVIRONMENT ENHANCEMENT

⁵ This legacy in terms of new equipment cannot be attributed to the facets of the analytical scheme. It is proposed to add the term "equipment" to the facet of urban development.

The Beijing Games left a lasting environmental legacy in terms of new, energy-efficient and eco-friendly buildings and venues. The city also invested in wastewater treatment and received a 4,000-strong fleet of buses powered by natural gas. Furthermore, 30 million trees (Zhao, Ching, He & Chan, 2016) and one million rose bushes were planted in order to green the city. The public green space per capita increased from 9.7 square meters to 12.6 square meters (UNEP, 2009). Additionally, 40km of rivers were cleaned (Zhao, Ching, He & Chan, 2016). Lesser improvements were recorded in terms of waste disposal and recycling (Cook & Miles, 2017).

The recorded number of factories that were moved out of the city to improve air quality varies between 140 (Dapeng, Ljungqvist & Troedsson (2010)) and 200 (Gratton, Preuss & Liu, 2015).

The results indicate that air quality improved in Beijing (due to factory closures and traffic control), but that these improvements were only short term. Furthermore, no reduced concentration of SO₂ could be determined (Huijuan, Fuhii & Managi, 2013). According to UNEP (2009), 200 factories switched to new kinds of cleaner production. Wang, Bao and Lin (2015) showed that Olympic regeneration had a double-edged effect. Their findings suggest that Beijing's Olympic regeneration significantly improved homeowners' welfare, while disadvantaged groups had to face relocation to undesirable areas, because of improved infrastructure, public security and urban environment. The study by Xing and Chalip (2012) investigated Games legacies in terms of urban development from the perspective of BOCOG workers. Although representing only a small part of Beijing residents, improved living conditions could be noticed.

POLICY AND GOVERNANCE

For the Games, the government initiated a program to change the behavior of Beijing residents and modernize the city (Gratton, Preuss & Liu, 2015; Liu, Broom & Wilson, 2014). This program included campaigns to forbid smoking, spitting, littering, impolite behavior and queue jumping. Yet it is not known how far the program really changed behavior. Further programs were initiated to put right the incorrect translations of English on signs and menus. Additionally, service providers received English language classes (Liu, Broom & Wilson, 2014).

Food safety was greatly improved (Gratton, Preuss & Liu, 2015) and new air pollutant emissions standards were implemented (Dapeng, Ljungqvist & Troedsson, 2010).

Because of the Olympic Games, China's media freedom was improved by upholding more media-friendly regulations and unblocking some websites like the BBC, Wikipedia and Blogger (Aryabaha, 2010). According to Xing and Chalip (2012), the Chinese government has become more transparent.

SKILLS, KNOWLEDGE AND NETWORKS

After the Olympic Games the tourism department began coordinating with international organizations and global sporting events. The tourism industry changed its marketing strategy over time, as a result of the impact of the Olympic Games (Singh & Zhou, 2016).

According to Giulianotti (2015) there are two key sporting legacies from the Olympic Games. First, the construction and expansion of a national football system, and second, the ability as well as the credibility of the nation to host future sport mega-events. Lei (2013) found no significant improvement in technical efficiency due to the event.

BELIEFS

Many studies tried to examine the effect of the Olympics on China's image. However, most of the studies were conducted right after the Games. Some studies found evidence for an improved national brand image both from a host residents' perspective (Aryabaha, 2010; Singh & Zhou, 2013) and a non-host perspective (Chung & Woo, 2011). Other studies found no effect on the city's brand (Bodet & Lacassagne, 2012; Li & Kaplanidou, 2013; Zhang & Zhao, 2009). Kim, Kang & Kim (2014) found mixed results for South Koreans. On the one hand, there were indications that the country's image as a destination had improved, while on the other hand, a negative influence in terms of culture and cultural image was found among people with previous experience of visiting China.

Another focal area of studies concerns perceptions of the impact of the event. Lee, Lee, Kang, Lee & Jeon (2013) examined Beijing residents' perceptions of the impacts before and after the Games. The study revealed that residents' expectations were not met and benefits were fewer than they expected. Chen & Tian (2015) surveyed residents of Beijing and Qingdao 41 months after the Games and found high support for the post-event impacts. This study is the only study with more than 1,000 respondents. Respondents believed that the benefits they had gained from the event outweighed the costs. Regarding the negative impacts, respondents perceived increasing prices

and were concerned about this development. Liu, Broom & Wilson (2014) investigated legacy perceptions of non-host city residents almost five years after the Games. The study found that Shanghai residents perceived a wide range of positive legacies. Identity and culture, psychic income and social capital as well as networking and cooperation were the three most significant. Respondents did not perceive an improved image of China and Beijing as a legacy of hosting the Games (ibid). The latter two studies are the only ones that benefit from a greater distance between the Games and data collection. Heslop, Nadeau and O'Reilly (2010) studied perceptions of non-host residents, and found that hopes for significant change in political freedoms in China were not only disappointed, but even set back. Study results showed that perceptions of almost all aspects measured in the study had declined. However, it must be added that the post-Games study was conducted only two weeks after the Games. Thus, the data is not appropriate for assessing legacies.

BEHAVIOR

Through the Games, Beijing became more accessible to the world. One reason for this was that native residents became collectively more welcoming, and treated visitors more hospitably than previously (Singh & Zhou, 2016; Xing & Chalip, 2012). Furthermore, there was an increased awareness of environmental issues among Beijing residents and businesses (UNEP, 2009). However, it is difficult to assess whether this increased awareness lasted for a long time period, or if began slowly but surely to fade, given that the UNEP report was prepared shortly after the Games. Furthermore, these legacies were not measured; rather, assumptions were made.

Feng and Hong (2013) investigated whether the Beijing Games had a long-term impact on grassroots sport participation in Chinese communities. The findings revealed no significant relationship between sport participation and the Olympic Games.

Through the Games, Beijing has improved people's health behavior and their health status, and the health environment in general (Dapeng, Ljungqvist & Troedsson, 2010). However, the causality of the assertions in this WHO report are often doubtful. They refer, for instance, to the number of public fitness facilities built in the city between 1995 and 2007, or to the smoking rate, which dropped between 1995 and 2007. Given that the Games were awarded to Beijing in 2001, and thus the period is not appropriate to measure effects of the Games, it is not possible to isolate any purely Olympic effect.

4.2.1.4 Athens 2004

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis for the 2004 Olympic Games in Athens includes nine empirical articles and seven articles that were conceptual or commentary. The majority of articles focus on the post-Games use of sport facilities (38%) followed by articles dealing with urban regeneration and the new infrastructure (31%). Further topics are tourism and behavioral changes. The articles cover four facets of legacy in the following industries: sport, city development, tourism, culture and environment.

Many results from the synthesis draw on articles that are commentary (e.g. Georgiadis & Theodorikakos, 2016; Kasimati, 2015; Panagiotopoulou, 2014). Consequently, the legacies described above are often not measured but only described. Some of the articles that are empirical are based on qualitative interviews (e.g. Kassens-Noor, 2013; 2015; Ziakas & Boukas, 2012; 2014). Thus, these studies provide more in-depth results. The remainder use secondary data. Overall, the articles agree on most findings, yet for many legacies concrete data are missing, making it impossible to evaluate whether legacies are positive or negative.

URBAN DEVELOPMENT

Through the Olympic Games, Athens' infrastructure was significantly upgraded and improved in all sectors – road, rail and air. According to Kassens-Noor (2010), the plans for Athens' infrastructure existed long before the city's bid. Hence, for many projects the Games served as a catalyst but were not the trigger for them.

The underground railway network grew by a factor of 1.74 (Tziralis, Tolis, Tatsiopoulos & Aravossis, 2006); in other words, the metro was extended by 7.7km and the suburban rail network by 32km (Kassens-Noor, 2013). New bus lanes and railway lines were also built. Additionally, more than 200km of motorways and roads were constructed or modernized (Kassens-Noor, 2015; Tziralis et al., 2006). In the run up to the Games, Athens completed construction of its new international airport, increased the parking infrastructure, installed a traffic management center and renovated train stations. Most of these infrastructure improvements have enjoyed popularity ever since and thus constitute a great legacy for the city. However, the tram to Glyfada could be described as a transport “white elephant” (Kassens-Noor, 2013). The tram is seen as an “IOC-driven legacy” (Kassens-Noor, 2012, p. 78), since it was necessary only to connect venues along the coastal line, but do not meet the requirements of the residents. The tram is

still in development; travel time would need to be decreased and further development is necessary along the coastal stretch to make it a viable mode of transport (Kassens-Noor, 2015). The new public transport infrastructure led to an increase of passenger movements by nearly 150 million transfers between 2001 and 2009. Despite the many projects and massive investments, Athens still struggles with traffic congestion (Kassens-Noor, 2015; Kissoudi, 2010).

One of the most important urban regeneration projects was the regeneration of the Phaleron Waterfront, which opens the city of Athens to the Mediterranean Sea (Furrer, 2002). The modifications in the port of Piraeus led to an increased number of cruise tourists after the Games (Georgiadis & Theodorikakos, 2016).

The Olympic Village has become a residential area and provides 2,292 accommodation units, which were offered at a reduced price to families with low income (Georgiadis & Theodorikakos, 2016; Kasimati, 2015; Panagiotopoulou, 2014). However, half of the 2,300 apartments were still vacant in 2011 (Zimbalist, 2015).

The city of Athens as well as ancient Olympia underwent substantial aesthetic modifications (unification of archaeological sites, renovation of tourist attractions, reconstructed streets and squares, renovation of Athens University halls, renovation and modernization of many facilities of the International Olympic Academy) (Georgiadis & Theodorikakos, 2016; Kissoudi, 2010). Thus, the Games also stimulated international interest in the city (Boukas, Ziakas & Boustras, 2013). As a result, Athens' ambitions for increasing tourism in the post-Olympic period were realized. Statistical data on tourism in Athens from 2000 to 2007 show notable growth in 2005. In 2006 the tourism growth rate was 9.8%, and in 2007 hotel occupancy reached 60.3%, higher than in previous years (Kissoudi, 2010).

On the other side, negative aspects have been documented in the loss of open spaces, a failure to increase urban green spaces and a failure to enhance the seafront to its full potential (Panagiotopoulou, 2014). Moreover, many projects relating to the Cultural Olympiad were not realized, in particular the museums that were due to be created using the new Olympic facilities (Papanikolaou, 2013).

In the prefecture of Argolis, several interventions were undertaken, which all contributed to the development of the whole region. Roads were improved, and archaeological sites were renovated. Further improvements created an environmental legacy (see environmental enhancement) (Georgiadis & Theodorikakos, 2016).

New essential sports facilities were created in Athens and in other cities (Georgiadis & Theodorikakos, 2016). However, in the years immediately after the event these facilities were underused and characterized as “white elephants”. One reason for this is the fact that 95% of the facilities were permanent in nature (Papanikolaou, 2013). Although the situation improved in subsequent years, in 2008 the Olympic Sports Complex remained underused and inaccessible to the public. Other venues await the realization of ambitious plans (Kasimati, 2015). In 2010, a number of post-Olympic venues were in either full or partial use. Other venues had been leased on short-term contracts or remained deserted. Although there have been efforts to utilize all assets, even seven years after the Games some facilities were still vacant or underused (Gold, 2017; Kasimati, 2015). One article published in 2013 showed that 16 out of 18 venues were used as sports centers or spaces for cultural events (Georgiadis & Theodorikakos, 2016).

According to Georgiadis and Theodorikakos (2016) the Olympic Stadium, which is the symbol of the new Athens, today hosts many sport federations, sport associations and cultural events. Yet it is difficult to evaluate this assertion without actual figures for stadium use. In 2010, for instance, there were only three stadium concerts and the general level of activity was assessed as low (Wergeland, 2012). More up-to-date figures are not available, but would be necessary to evaluate the true legacy of the Olympic Stadium.

ENVIRONMENT ENHANCEMENT

The ecological interventions in Schinias and the Phaleron waterfronts substantially improved the environment. This huge project combined efficient waste management, the revitalization of the destroyed biotopes in the area, control of waterways and expansion of vegetation through tree planting, and contributed to the return of rare species in the region (Georgiadis & Theodorikakos, 2016).

The prefecture of Argolis benefited from the building and enhancement of sewage systems and flood protection works. Biological wastewater treatment has led to a cleaner and healthier environment in this region (Georgiadis & Theodorikakos, 2016).

Despite these environmental improvements, the protection of the environment received little attention and missed opportunities prevail in this facet (Kissoudi, 2010). According to the environmental assessment of the Games by WWF (2004) “there will be no progress in the energy sector, no introduction of new water management and

conservation technologies, no improvement in the waste management system and no progress in the area of environmentally friendly construction technologies.” Thus, no legacies in these areas could be detected.

SKILLS, KNOWLEDGE AND NETWORKS

The expertise gained in organizational, technological and security issues as well as new networks resulting from the large-scale cooperation are achievements of the Games (Panagiotopoulou, 2014; Ziakas & Boukas, 2014). However, the authorities do not use it to promote the city as a cultural, tourism and sport destination, and the full potential of the Olympic legacy has not been realized (Ziakas & Boukas, 2012; Ziakas & Boukas, 2014). Furthermore, one potential source of criticism is that investments in education, social welfare and environment were neglected (Panagiotopoulou, 2014). Aspects of the Cultural Olympiad such as “Olympic Education” and the “Olympic Truce” were also not realized, and are part of the missed opportunities (Papanikolaou, 2013). Another legacy of the Games is the international master’s program in “Olympic Studies, Olympic Education, Organization and Management of Olympic Events”. The program began in 2009, and up to 2016, 72 students from different countries took part (Georgiadis & Theodorikakos, 2016).

BEHAVIOR

The new infrastructure, it was hoped, would help to change Athenians’ habit of using their cars instead of public transport. In the years after the Games, approximately 650,000 passengers have used the underground every day, and it has been estimated that the number of cars in the city center has been reduced by 70,000 daily because of the metro. Despite these figures, modernization of the public transport system failed to encourage Athens’ citizens to use public transport (Kissoudi, 2010). A reliable statement concerning this issue would require appropriate data collection.

No sporting participation legacy could be observed, only short-term effects (Pappous, 2011). The study used secondary data to try to derive the effect of the Olympic Games on sport participation. However, the secondary data do not constitute a valid and reliable source for measuring a legacy in terms of enhanced physical activity.

4.2.1.5 Sydney 2000

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis for the 2000 Sydney Olympic Games includes eight empirical articles and eight articles that were conceptual or commentary. The articles focus on the Sydney Olympic Park (31%) and the post-Games use of sport facilities (25%). The articles cover five facets of legacy in five different industries: sport, city development, environment, volunteering and security.

The articles included were all (except for two) published after 2008; it is thus possible to assess the long-term development and legacy, not just short-term impacts.

URBAN DEVELOPMENT

For the Sydney Olympic Games, a major upgrade of Sydney Airport was brought forward, involving the redevelopment of the international and domestic terminals along with related transport infrastructure. Connections between the airport and the city center were also enhanced (Kassens-Noor, 2013; Searle, 2012). New highways, a new rail loop and a new rail station connecting Homebush to the city center were also constructed. Improvements to transport infrastructure were concentrated on providing access to Homebush and the airport connection. Additionally, a new Intelligent Transportation System center was built, and the ITS System was upgraded (Kassens-Noor, 2013). However, the rail loop could be considered as a transport “white elephant”. It allows only poor access to the city center and consequently has consistently low ridership. More than a decade after the Games, Sydney is still in the process of developing sustainable solutions for the infrastructure created exclusively for the Olympics (Kassens-Noor, 2012).

Sydney increased its stock of hotel rooms by 30% to accommodate expected Olympic visitors. However, by the end of 2004, ten of the city’s major hotels had closed. The Olympics did not cause a strong impact on tourism as forecasted; in fact, as soon as the Games finished, there was a fall away in inbound activity (ETOA, 2006).

Sydney Olympic Park can be seen as the major legacy of the Olympic Games. Although the park had a difficult start and received criticism for underuse in the years immediately following the Games, the park is now an important community asset, particularly for people living in western Sydney (Cashman, 2011; Davidson & McNeill, 2012; Toohey, 2010). Since 2000, there has been a steady increase in annual visits to

Sydney Olympic Park. And yet Toohey (2008) states that it is now impossible to determine the role played by any residual Olympic effect.

The park has nine major sporting, event and entertainment venues, surrounded by Sydney's largest urban green space (Toohey, 2008). The park still attracts major events, but smaller ones are also hosted there. In 2005, more than 4,000 different events were held at Sydney Olympic Park, attracting 3.6 million people to the venue (Toohey, 2010). The park is unique in sport participation figures. In 2010, more people came to the park to participate in sport than to watch sport at the various Sydney Olympic Park venues (Cashman, 2011). However, it is still unclear whether the huge public spaces of the park can be used to create an urban vibrancy, which is currently lacking. This would be necessary to capture the full potential of the site and its Olympic infrastructure (Searle, 2012). Despite its success, the park still faces issues of sustainability and transport for the future (Cashman, 2011). According to Freestone & Gunasekara (2017), the allocation of funds from the state government is progressively diminishing. The role of Sydney Olympic Park has gradually been reduced in recent years, and staff numbers have been cut down.

In terms of the sport facilities, results are mixed. Generally, the sporting infrastructure legacy is improving, but there are also Olympic burdens that remain (Toohey, 2008). Most of the facilities at the park, especially the smaller stadiums such as the pool and the hockey and tennis centers, enjoy high levels of local community use and continue to stage an increasing number of events (Cashman, 2011; Searle, 2012; Toohey, 2012). Other venues like the equestrian, rowing and shooting venues have low usage and require significant state operating subsidies, since the operating costs cannot be covered by revenues. The athletics center is an important asset for Sydney, since it is the primary international-standard venue for major athletics events. The Olympic white-water rafting course is also well used (Searle, 2012). The two largest venues, the Telstra Stadium and the Acer Arena, struggled initially. The Telstra Stadium is underutilized since there are not enough major sporting or musical events for such a big stadium (Searle, 2012). The Acer Arena (former SuperDome) faced similar problems, and there were not enough indoor events in Sydney requiring the capacity of the Arena. As a result, the venue filed for bankruptcy. The arena had to reinvent itself and has hosted a number of major popular music events in recent years (Cashman, 2011; Searle 2012). According to Searle (2012, p. 197) the Arena "is now claimed to be one of the most successful indoor entertainment complexes in the world."

In addition to Sydney Olympic Park, another significant urban development initiative was the creation of Sydney's largest urban park, Millennium Parklands (ibid). One more important legacy for Sydney is located in Newington. The former Olympic Village has become a vibrant suburb with a reputation for environmental excellence (see environmental enhancement) (Davidson, 2015; Searle, 2012). Sydney's hotel capacity was significantly increased in the run up to the Games (Searle, 2012).

ENVIRONMENT ENHANCEMENT

The environmental legacy of the Sydney Olympic Games is most apparent in Sydney Olympic Park's Parklands. The Homebush Bay area was transformed "from a polluted, industrial wasteland to a revitalized complex of venues, wetlands and parklands" (Furrer, 2002, p. 12).

The Millennium Parklands between Olympic Park and Parramatta River also contain wetlands and grassland habitats regenerated from former industrial land, as well as cycle routes and footpaths (Searle, 2002).

The former Olympic Village at Newington has demonstrated sustainable residential development (Searle, 2012). The suburb features solar panels and a recycled water system throughout (Davidson, 2015; Searle, 2012). However, the demonstration effect of these features has been limited by their cost, thus the environmental legacy is also limited to the suburb of Newington.

POLICY AND GOVERNANCE

To leverage the effects of the Olympic Games and to create a lasting legacy for elite sport, the Australian Olympic Committee created the Australian Youth Olympic Festival. This festival, which takes place every second year, aims to give aspiring elite athletes the possibility to compete in a multi-sport competition, and thus to gain experience of an event similar to the Olympic Games (Toohey, 2008).

In the run-up to the Games, the Homeless Protocol was established. The Homeless Protocol is "a code of practice for how police, security, council rangers and other officers should address street homeless people; and an assistance and referral service to be operated by homeless persons' workers." (Minnaert, 2012, p. 8). The Homeless Protocol constitutes a lasting legacy of the Sydney Olympic Games for socially excluded groups, by providing a long-term form of legal protection for homeless people (ibid).

In terms of security, the security hardware remained outside Olympic venues. Furthermore, there was a legacy of increased government intrusion into civil liberties, since some Olympic legislation did not cease when the Games ended (Toohey & Taylor, 2012).

SKILLS, KNOWLEDGE AND NETWORKS

After the Sydney Olympic Games, a website was created for volunteers to remain in contact with each other and to keep informed about future events. According to Cashman (2006), this website constitutes a volunteerism legacy of the Games. However, it is questionable whether the simple existence of such a website is evidence of a sustainable legacy. According to Sumray (2015), Sydney did not create a strong volunteering legacy, due to data protection issues concerning the volunteer database, which were never effectively resolved.

The results provided by Fairley, Gardiner and Filo (2016) are more positive. They revealed five key legacy outcomes of the Sydney Games. The most important ones were that volunteering at the Games was often the impetus to start or rekindle a volunteer career. Additionally, volunteering helped those concerned to develop skills and abilities. According to these results, there is a legacy of a skilled volunteer base which has been motivated to undertake further volunteering activities as a result of the Sydney Games.

According to Toohey (2010), many of the Sydney 2000 volunteers have continued to provide services to the Olympic Games by volunteering at the subsequent Games in Athens and Beijing. There is no evidence for this assertion, however.

The Sydney Olympics marked the start of the Transfer of Knowledge (TOK) program. For the first time, explicit and tacit knowledge from over 90 relevant SOCOG managers was collected and sold to the IOC. The Olympic knowledge was then disseminated to the OCOGs of the Salt Lake City and Athens Olympic Games (Toohey, 2008).

BEHAVIOR

An analysis of the Sydney 2000 Olympic Games' effect on sport participation provides mixed evidence. Veal, Toohey and Frawley (2012) found that there may have been a positive effect on sports participation. However, they also add that this conclusion can only be drawn tentatively, due to the lack of reliable data, and that it is not possible to conclude that the Games left a legacy of sport participation in Australia. The authors

conducted a secondary analysis of national survey data not specifically designed for measuring a sport participation legacy. Additionally, the design of adult participation data collection instruments changed at a key time in the “before and after” research process. Thus, any conclusions can only be extremely speculative. Furthermore, Veal, Toohey and Frawley (2012, p. 155) emphasize, “even when reliable and consistent participation data are available, the question of causality in the context of the wider sport development and participation system remains to be addressed.” They also note that the level of sport participation is a dynamic phenomenon and there are many influences besides an international sporting event. As a result, they call for a much better understanding of the whole system for sport development and sport participation, with further research including the impact of policy initiatives and health promotion strategy. The systematic review by Weed et al. (2015) reveals that some studies support the idea of increased sport participation (Haynes, 2001; Veal, 2003), while others fail to address the issue (Cashman, 2006; Murphy & Bauman, 2007).

4.2.1.6 Atlanta 1996

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis of the 1996 Olympic Games in Atlanta includes eight empirical articles and three articles that were conceptual or commentary. The topics of the articles are mixed. There are six articles that deal with the Atlanta Games exclusively, while five other articles analyze different topics for several Games together. Thus, the Atlanta case was only covered marginally in the latter group of articles. The articles cover two facets of legacy in three different industries: city development, sport and housing. Three other articles focus on the economic impact of the Games and the effects on the labor market, but they could not be assigned to the analytical scheme.

URBAN DEVELOPMENT

In the run-up to the Games, improvements in the city’s infrastructure were undertaken. Road upgrades focused on the expansion of the most-traveled highway routes and downtown (Kassens-Noor, 2013). Atlanta’s intelligent Transport System was upgraded and new traffic management centers, observation cameras along travel routes and variable message signs were put in place (Kassens-Noor, 2010). Furthermore, new train and metro stations were built or improved. The Hartsfield-Jackson Atlanta Inter-

national Airport underwent significant improvements, including the addition of an international terminal, the underground connection to Hartsfield's concourses and an atrium (Kassens-Noor, 2013). The MARTA rail system received an extension in the north, which has been a success since its inauguration (Kassens-Noor, 2010). However, according to Kassens-Noor (2012) Atlanta missed the opportunity to bring about major change in how people would travel in Atlanta in the future. However, no empirical data exist to make a real assessment of the legacy of the public transport measures. As far as causality is concerned, Kassens-Noor (2012) further asserts that the Olympic Games accelerated transport projects that had been planned before the Games.

The Centennial Olympic Park is a lasting legacy of the 1996 Games and emerged afterward as a catalyst for downtown development. In 2016, the park received the Downtown Economic Impact Award for its profound impact on the development of downtown Atlanta and the tourism industry. The park has attracted \$2.2 billion of new development to downtown Atlanta over the last twenty years (Smith-Williams, 2016). The area of downtown Atlanta underwent several improvements, e.g. streets were improved with new curbs and sidewalks, new streetlights, new businesses and new loft housing. The most important legacy from a downtown perspective was the construction and rehabilitation of several hundred downtown housing units (RA, 1996). Around one hundred million dollars were allocated to neighborhood redevelopment. The Summerhill neighbourhood, for example, received significant benefits. The part of the Olympic Village that was located on Georgia Tech's campus served as student housing after the Games (Davidson, 2015). However, other low-income neighborhoods received little advantage from the Games (Newman, 1999). Many citizens hoped that the Olympic Games would motivate the city to start solving some of the social problems of the city but after the Games, the conditions in the inner-city neighborhoods remained the same (French & Disher, 1997). The Olympic Games triggered the modern redevelopment of Atlanta, but after gentrification only people who could afford average housing costs were able to live there (COHRE, 2007). According to Malfas, Theodoraki and Houlihan (2004, p. 213) "The 1996 Atlanta Games serves as an illuminating case of the negative social impacts of a mega-sporting event." During the preparations for the Games, 15,000 citizens were evicted from public housing projects that were demolished to give space for Olympic accommodation. Furthermore, 9,500 units of affordable housing were lost between 1990 and 1995, and 350 million dollars, which were previously earmarked for social services, support services for homeless and poor people and low-

income housing, were used for Olympic preparation (Malfas, Theodoraki and Houlihan, 2004). COHRE (2007) reports a loss of at least 2,556 affordable housing units.

By contrast, Somerville and Wetzell (2010) found no evidence for increased house prices through hosting Olympic Games (see chapter 4.2.1).

In terms of sport, Atlanta has benefited from a number of new, permanent sports facilities. The Olympic Stadium was converted to a baseball park and became the new home for the Atlanta Braves. Besides the Olympic Stadium, several other permanent venues were built, renovated or expanded (RA, 1996). However, the extent to which these facilities are used is unknown, which makes it difficult to assess the true legacy.

POLICY AND GOVERNANCE

One report summarizes Atlanta's legacy as follows: "Atlanta's Olympic legacy is the creation of a city that is privatizing its healthcare, its public utilities, its public land and eliminating very low cost housing, public healthcare, and access to public transportation" (COHRE, 2007).

Minnaert (2012) also shows that Atlanta created no legacy for socially excluded groups despite explicit objectives that were targeted in the bid.

For the Atlanta Games, several articles analyzed the impact of the Olympic Games on employment. According to Hotchkiss, Moore and Zobay (2003), 293,000 additional jobs in Georgia counties were created through the Olympic Games. Data for the period from 1985 through the third quarter of 2000 were obtained. Baade and Matheson (2002) tried to assess the economic impact and, by using data from 1991 to 1997, estimated that 3,500 to 42,500 additional jobs were created. Feddersen and Maennig (2013) tried to extend these studies in several ways by using two different variants of the difference-in-difference approach, with data from 1990-2008. The study found only short-term effects in the sectors of retail trade, accommodation and food services, and arts, entertainment, and recreation. However, all these studies used a top-down approach, leading to problems of reliability and causality (see chapter 5).

4.2.1.7 Barcelona 1992

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis of the 1992 Olympic Games in Barcelona includes three empirical articles and seven articles that were conceptual or commentary. Thus, most of the articles only

describe legacies, while empirical data are missing. Almost all articles focus on the urban transformation of the city (67%). Other topics play a minor role and are not well researched. The articles cover five facets of legacy in five different industries: city development, tourism, sport, events and arts.

Although the Barcelona Games are an often-cited example of how to use the Olympic Games as a catalyst for urban transformation, there are only a few articles dealing with the Barcelona legacies. No peer-reviewed journal article that deals exclusively with the Barcelona Games was found.

URBAN DEVELOPMENT

The Olympic Games in Barcelona are often considered the most significant mega-event in terms of urban development (Malfas, Theodoraki & Houlihan, 2004). The city undertook major upgrades to road systems, including a new ring road around Barcelona (Essex & Chalkley, 1998; Kassens-Noor, 2012). Through this measure, inner city traffic was relieved. Because of this, the ring road was considered the most important legacy for Barcelona residents (Kassens-Noor, 2012). Additionally, existing roads were expanded (Kassens-Noor, 2013). Barcelona airport received major extensions, and the connection between the airport and the city center was improved (Kassens-Noor, 2013). According to Kassens-Noor (2012), the plans for infrastructure improvements existed long before the city's bid, and thus the Olympic Games served mainly as a catalyst for urban development. Because of the Games, fifty years of development occurred in only six years (Kenett & de Moragas, 2006).

The city also implemented escalators and funiculars, an inclined railway leading up Montjuic Mountain. However, the funiculars remained underused both during and after the Games. Further legacies result from vastly improved public spaces, upgraded walkways and new or upgraded train stations (Kassens-Noor, 2010, Kennett & de Moragas, 2006). Montjuic Park where many venues were located, was revitalised. The Intelligent Transportation System of the city was upgraded (Kassens-Noor, 2013).

A major legacy of the Barcelona Games was the rejuvenation of a run-down coastline, which now has leisure facilities, attractive sandy beaches and a new harbor (Essex & Chalkley, 1998). The former Olympic Village is now a residential area with restaurants, beaches, cinemas and bars, constituting a legacy for the upper and middle class. The inhabitants of this district are young, well-educated and well-off (Carbonell, 2005). Some 4,500 new flats and 5,000 hotel rooms were created (Telesca, 2014). All the

facilities built for the Olympic Games, such as the new auditorium, national theatre and the opera, are being fully used (Trunó, 2003).

Another major improvement concerns the upgrading of the urban technology and telecommunications systems. Two communication towers were constructed (Telesca, 2014). These improvements were important for the further development of the city as an administrative center (Essex & Chalkley, 1998).

Barcelona left a remarkable sporting legacy as well, including a number of new facilities. The city sought to place these facilities in the areas of greatest community need, to address regional disparities. Furthermore, existing facilities were refurbished. As a result, the new or improved facilities are located in four distinct areas of the city and 15 of the surrounding communities, leaving a legacy for several municipalities (Kidd, 2013). However, little information is available on how much the venues were used after the Games. The Olympic Stadium and the indoor Palau St. Jordi arena are still used for local, national and international cultural and sporting events. However, from 1992 to 2014, the Olympic Stadium lacked a primary tenant. In 2014, the stadium was turned into an upscale sports theme park (Zimbalist, 2015). The Pircornell Swimming Pool was opened to the public (Kennett & de Moragas, 2006). Regarding the Olympic Stadium, Davidson and McNeill (2012) state that the stadium was rarely used for many years and now lies largely vacant.

ENVIRONMENT ENHANCEMENT

The sewage system of the city was restructured (Essex & Chalkley, 1998).

SKILLS, KNOWLEDGE AND NETWORKS

According to Trunó (2003), the city has learned how the private and public sector can work together through hosting the Games.

Another benefit from hosting the Games was increased expertise in hosting major events in the city, and how to use them for urban development. In 2004 the city held the Universal Forum of Cultures, a combination of exhibitions, debates and cultural displays over 141 days. For this event, the city repeated its strategy of regeneration and gentrification (Kenett & de Moragas, 2006).

INTELLECTUAL PROPERTY

The Barcelona Games not only created legacies for the city but also for several sports. For the Olympic Games, the judges' chairs in badminton, swimming, table tennis, and tennis as well as the equipment stands and carts in athletics, judo, handball and other sports were reconfigured by designers. Today, several of the new designs are the international standard (Kidd, 2013).

BELIEFS

As a result of the Games, Barcelona benefited from an enhanced international image and positioning (Kenett & de Moragas, 2006; Trunó, 2003). Consequently, business confidence in Barcelona improved notably in the post-Games period (Brunet, 2005). This new image, in combination with the publicity and the investment in infrastructure, caused an enormous growth in tourism, which is considered as one of the most important legacies of the Olympic Games (Kenett & de Moragas, 2006). However, the tourism legacy cannot be solely attributed to the Olympic Games since the city continued to invest in Barcelona's tourist destination product and its promotion (Kenett & de Moragas, 2006). Thus the Games can be seen as the initial impetus, but not as the only trigger. As a result, measuring the tourism legacy and the net Olympic effect is extremely difficult (see also chapter 5).

4.2.1.8 Seoul 1988

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis for the Seoul Olympic Games includes five articles that are commentary and one article that is empirical. Consequently, virtually none of the findings rely on empirical data. The articles cover five facets of legacy in three different areas: city development, politics and culture.

Generally, the legacies of the Olympic Games can be seen as the "foundation of an advanced nation" (Bridges, 2008, p. 1949). Through the Games, Seoul followed Tokyo in becoming an Asian global city. The Olympic Games left a massive and far-reaching economic legacy, which was the basis for Korea's transition to a Western-style liberal democracy (Horton & Saunders, 2012).

URBAN DEVELOPMENT

The city of Seoul underwent major development of its infrastructure and public transport. Three new subway lines were constructed and 47 bus routes were extended. The international airport was also extended. Additionally, a program of refurbishment and extensive repair of historic monuments was undertaken. The Seoul Arts Center, the National Classical Music Institute, the National Museum of Contemporary Arts and the Chonju Museum were built to emphasize the cultural aspects of the Games (Chalkley & Essex, 1999)

ENVIRONMENT ENHANCEMENT

Several programs were conducted which led to significant legacies in terms of environmental enhancement. One program was implemented to remediate the Han River. Further programs were introduced to deal with water quality preservation, air pollution, garbage control and the renovation of traditional restaurants (Chalkley & Essex, 1999). An environmental beautification program improved the aesthetics of the streets and removed sources of physical pollution. 389 new parks and 152 refurbished parks were introduced (ibid).

POLICY AND GOVERNANCE

The Olympic Games had a beneficial impact on domestic politics and served as the major catalyst for the democratization of Korea (Bridges, 2008). Although others consider the link between the Olympic Games and the democratization to be overstated (Yoon, 2009), there is a consensus that the Games did have a major influence on the ideological, economic and political course taken by Korea (Horton & Saunders, 2012). With the liberalization of travel rules just one year after the Olympic Games, Korean people were increasingly able to travel abroad (Cho & Bairner, 2012).

Furthermore, the curfew system was lifted, a necessary step for attracting foreign visitors (Cho & Bairner, 2012).

SKILLS, KNOWLEDGE AND NETWORKS

The Olympic Games marked the beginning of trade and diplomatic relations with Eastern European countries, then the Communist bloc (Yoon, 2009). The subsequent alliances constitute a significant legacy of the Games (Horton & Saunders, 2012). Furthermore, the Olympics led to a culture of volunteering. During the FIFA Football World Cup in 2002 nearly all Koreans were mobilized for voluntary actions (Kang, 2003).

BELIEFS

As a result of hosting the Olympic Games, the perception of Korea by the outside world has changed. Korea went from being the “war-ridden country” to “host of the Seoul Olympic Games” (Kang, 2003).

According to Bridges (2008, p. 1949)

“in retrospect, perhaps the most pervasive legacy for the Koreans themselves is that the Seoul Olympics and the ‘Olympic spirit’ can still serve as a means to appeal to collective memory and collective mobilization whenever the government and people have to wrestle with another major challenge to the country’s self-confidence and image.”

Through the Olympic Games, Koreans obtained a mindset of “we can do it” (Cho & Bairner, 2012). Kang (2003) states that the Games served as a “looking-glass” for Koreans and for the world. “The World has come to Seoul and Seoul has come to the World.” (ibid, p. 329).

4.2.1.9 Los Angeles 1984

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis for the 1984 Olympic Games includes six articles, which are all commentary. Thus, the legacy is described but not measured. The articles focus on the financial surplus created by the Games, its usage and how the Games changed the trajectory of the Olympic Movement. The articles cover four aspects of legacy in the following industries: sport, city development and events.

The 1984 Olympic Games generated a \$232.5 million surplus. The surplus was used to endow the LA84 Foundation (formerly the Amateur Athletic Foundation), which was created after the Games. The LA84 Foundation funded a wide range of projects and by doing so created many legacies from the surplus (Wilson, 2015).

URBAN DEVELOPMENT

The 1984 Olympic Games prioritized the use of pre-existing facilities, thus only minor investments were made in the run-up to the Games (Wenn, 2015). Legacies of the limited construction program were improved stadiums, a new velodrome, a new swim stadium, a new shooting range (Wilson, 2015) and major renovations for the airport (Andranovich & Burbank, 2011). However, in the three decades following the Games, nearly 100 sport facilities in southern California were constructed or improved with the surplus from the Games (Llewellyn, Gleaves & Wilson, 2015). These facilities mainly

served the needs of community-based programs and grassroots sport. A few of them are nevertheless also used for elite athlete training and development. By 2013, the facilities served an estimated 500,000 young people and adults each year (Wilson, 2015).

Furthermore, the telecommunication infrastructure was improved with the installation of fibre optic technologies (Andranovich & Burbank, 2011; Dyreson & Llewellyn, 2008) and new hotel rooms away from the city center were created. Overall, 12,000 new hotel rooms were built from 1982 to 1984 (Andranovich & Burbank, 2011).

SKILLS, KNOWLEDGE AND NETWORKS

Wilson (2003) mentions the legacy of experienced sport administrators whose reputations were built by their involvement with the LAOOC. Former LAOOC employees have held a wide range of positions throughout national and international sport, including IOC members, and chairman and chief executive officer of FIFA's 1994 World Cup organizing committee. They also consulted or worked as staff members of other Olympic organizing committees after 1984.

INTELLECTUAL PROPERTY

The sponsorship model pioneered by LAOOC has become an important legacy of the Games. After 1984, every Olympic organizing committee used essentially the same approach. Moreover, the model provided the blueprint for the creation of the IOC's worldwide TOP sponsorship program (Wilson, 2003).

BELIEFS

The city of Los Angeles used the Olympic Games to redefine its image to the world. Through the new image, Los Angeles has been able to attract over 200 national and international sporting events (Wenn, 2015).

The 1984 Los Angeles Olympic Games also changed the general perception of the Olympic Games. Because of their financial success, cities were encouraged to re-enter the bidding for Olympic Games, since the Games convinced the world that the Olympic Games represented a valuable commodity (Dyreson & Llewellyn, 2008). After 1984, the number of bidding cities climbed dramatically. Thus, the Games also served as an important legacy for the whole Olympic Movement.

4.2.1.10 *Moscow 1980*

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

As far as the legacy of the 1980 Moscow Games is concerned, information was retrieved from one overview article by Chalkley and Essex (1999). The article describes some of the investments for the Games, but their post-Games usage, and hence their legacy, remains unclear.

URBAN DEVELOPMENT

For the Moscow Games, 12 new sports facilities were constructed and 13 existing facilities were renovated. Furthermore, a new air terminal, new hotels and buildings for the media including the Olympic Communications Center and the Novosti Press Agency were built (Chalkley & Essex, 1999).

4.2.1.11 *Montreal 1976*

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis for the Montreal Games includes four sources, three of which are scientific papers. Two papers are commentary and focus on the Olympic facilities. The other addresses the political and diplomatic legacies. The information about the Olympic facilities is highly contradictory, making an evaluation of the real legacy difficult.

URBAN DEVELOPMENT

In order to improve access to the Olympic Park, the subway system had to be extended by 20km. A new airport was built, as well as several new roads and hotels (COJO-76, 1978). According to Marsan (1988), the Games did not generate any significant physical developments.

The choice of the site for the Olympic facilities and the design of some of the installations led to several problems in the run-up to and after the Games. For the Olympic site, century-old trees were cut to create a passageway. This was viewed as an assault on the quality of life in the urban environment (Marsan, 1988). For the construction of the Olympic Village, 80 acres of parkland were lost (Iton, 1988). The residential design of the Olympic Village was considered very inappropriate to the social housing needs of the working class districts (Marsan, 1988).

In terms of the sporting facilities, the available information is contradictory. According to Marsan “the stadium, the velodrome and the Olympic village contribute nothing to

the neighbourhoods where they were built.” (1988, p. 21). On the contrary, Iton (1988) asserts that a variety of events took place at the stadium and the velodrome. Since 1976, over 40 million people have attended events at the Olympic Park. The sailing facilities at Kingston provided recreational opportunities for residents. The Olympic pool complex has been open to the public since January 1977 (Iton, 1988).

POLICY AND GOVERNANCE

The Montreal Games also generated important political and diplomatic legacies as a result of the boycott by 28 African countries. The boycott was the main catalyst for Canada’s decision to take a leading role in developing the Commonwealth’s Gleneagles Agreement, which isolated South Africa from world sport to oppose apartheid (Griffin, 2015).

4.2.1.12 Munich 1972

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

For the 1972 Munich Games, four articles were considered. The main information is drawn from three commentary articles which focus on physical legacies. The other article is empirical, but addresses only the regional income and employment effects of the Games. Two aspects of legacy are covered. Overall, “The Munich Games marked an important stage in the Land’s post-war development from a backward, agricultural economy to one of the richest states in the country by the 1980s” (Schiller & Young, 2015, p. 353).

URBAN DEVELOPMENT

For the Munich Games, the city’s traffic infrastructure was dramatically improved. A suburban rail system was created with twelve separate lines and 134 stops. Additionally, two subway lines were added. Through these measures, individual car use was reduced by 40% (Schiller & Young, 2015). Further improvements were made within the city, such as the construction of three new expressways, the restoration and pedestrianization of the historic quarter, the provision of underground car parking and the development of a new shopping center with hotels (Chalkley & Essex, 1999). Much of this would have come about regardless of the Games, but the Games brought financial support and served as an accelerator. However, there were also serious drawbacks. First, the construction of a ring road caused a great deal of aesthetic damage. Second,

the monocentric orientation of the S-Bahn, which was caused by time constraints, led to problems in the aftermath (Schiller & Young, 2015).

Through the Games, Munich received “fabulous new sports facilities and parkland, 6,000 apartments, 1,800 student flats, three schools with 7,650 places and a large exhibition hall” (Schiller & Young, 2015, p. 352). The Olympic Park in particular proved a lasting attraction and is one of Munich’s most important recreational areas (Meyer, 2017; Schiller & Young, 2015). The Olympic Village provided accommodation for middle- and lower-income families and single persons after the Games. The village has become a successful self-sustaining community and one of Munich’s most popular neighborhoods (Chalkley & Essex, 1999; Meyer, 2017).

SKILLS, KNOWLEDGE AND NETWORKS

The Munich Games were carried through by thousands of young adults in their twenties and thirties. The experience, skills and knowledge they learned from the Games helped them to gain influential positions in public life and businesses after the Games (Schiller & Young, 2015).

Jasmand and Maennig (2009) examined the regional income and employment effects of the Munich Games. They revealed that income in Olympic regions grew significantly faster than in other German regions, but no employment effects could be identified. The authors used a difference-in-difference approach for their study. The problems of such an approach are outlined in chapter 5. However, the authors also warn about the reliability of their results, stating

“taking into account the absolute size of the Olympic economic effect and of the German economy as a whole, there is [...], relatively little chance of identifying any significant employment effects at a national level using the existing methods and data. The same reasoning also applies for income data.” (Jasmand & Maennig, 2009, p. 999).

4.2.1.13 Mexico City 1968

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis for the Mexico City Olympic Games in 1968 includes three commentary articles. The articles give a broad overview of the long-term impact of the Olympic Games. However, it is often difficult to distinguish Olympic-related changes from the general development of the city. Further articles to double-check the statements are

missing. The articles cover three facets of legacy in the following industries: city development, sport, events and tourism.

URBAN DEVELOPMENT

For the 1968 Olympic Games important public works were carried out, including renovation and modernization of the airport, urban service network, utilities, transit systems, expressways, under and over-passes, etc. Furthermore, new housing complexes, hotels, warehouses, hospitals and medical service facilities were built. The Olympic Villages are now social interest housing complexes (Aguilar-Darriba, 1988). However, the real legacy of the Olympic Village differed from the original intention. There was no demand for the apartments and two years after the Games the village was still half empty, with no one on the waiting list for several reasons. The location of the village was problematic, for instance, since the city center was nine miles away and there were no shops, supermarkets or places of employment adjacent to the site (Barke, 2017).

Seven new sporting facilities were built, others were refurbished. After the Games, the facilities were used for various purposes, and several national and international events were held there. "Looking back twenty years, we deem the Mexican Olympic Sports Center the most important legacy of the Games" (ibid, p. 22). The Mexican Olympic Sports Center has been used as the training site for Mexican elite athletes. It is also the headquarters of the Mexican Olympic Committee.

The facilities used for the Cultural Olympiad were used for cultural, artistic, technological, scientific and social events.

SKILLS, KNOWLEDGE AND NETWORKS

According to Aguilar-Darriba (1988), Mexico established more and better relations with other nations and international organizations after the Games. Mexico gained experience in hosting a sport mega-event, which was of importance since the football World Cup was also staged in Mexico two years later (Epilogue, 2009).

INTELLECTUAL PROPERTY

Mexico City was the first host city which had an "Olympic Identity Program" that introduced strong decorative elements and signposts to the whole city, particularly the Olympic routes, to create a carnival atmosphere. This strategy has been widely

adopted by later Games organizers, and consequently can be seen as a legacy for the Olympic Games (Liao & Pitts, 2006)

BELIEFS

Mexico's image abroad has improved as a result of increased tourism. This increase can, at least in a small measure, be linked to the Olympic Games (Epilogue, 2009). Aguilar-Darriba (1988) also refers to the improved image of the country, which enabled Mexico to attract more tourists in the aftermath. Furthermore, the Olympic Games gave Mexicans the opportunity to create a positive self-image (Epilogue, 2009).

4.2.1.14 Tokyo 1964

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis for the 1964 Olympic Games in Tokyo includes five articles, which are all commentary. The articles focus on the urban development of the city as well as measures for environment enhancement. Four aspects of legacy are covered in the following industries: city development, health, environment and education.

URBAN DEVELOPMENT

Tokyo used the 1964 Tokyo Olympic Games to give impetus to its already proposed ten-year development plan. As a result, the Games contributed significantly to the rebuilding of the city (Tagsold, 2010); 97% of the Olympic budget was used for infrastructure improvements (Shimizu, 2014). A total of 22 main highways were constructed (Chalkley & Essex, 1999) as well as the Shinkansen bullet train and the monorail connecting the inner city with the airport (Shigeru, 1988; Tagsold, 2010). The subway and national railway system were expanded, making it easier for workers to commute to Tokyo. Despite these improvements, several problems occurred after the Games, since planning for the Olympic Games did not take sufficient account of the potential for vast urban changes to continue after the Games (Shigeru, 1988).

The Olympic facilities in the south-west of Tokyo became public parks and sports facilities (ibid).

ENVIRONMENT ENHANCEMENT

For the Tokyo Games, the canalization systems were renewed. The revitalization of Tokyo's main river Sumida was also important for the city (Tagsold, 2010). Further

measures were undertaken to develop and improve the water supply system in order to solve chronic water shortages (Chalkley & Essex, 1999; Shigeru, 1988). Moreover, three sewage disposal plants were built to improve Tokyo's waste management system. Standards of public health within the city were improved by various measures: cleaning of streets, rivers and streams, renovation of public toilet facilities, food hygiene controls and checks, regular refuse and garbage collections (Chalkley & Essex, 1999). Tokyo was transformed into a clean and hygienic city (Shimizu, 2014; Tagsold, 2010).

SKILLS, KNOWLEDGE AND NETWORKS

Masumoto (2012) examined the legacy of Olympic education. The 1964 Tokyo Games were the first to feature an Olympic education program. However, he concludes that Olympic education basically disappeared after the Games, and there was no legacy in this area.

BELIEFS

The Tokyo Games played an important part in transforming the image of Tokyo and Japan from a postwar city/country to a modern metropolitan community (Tagsold, 2010). There is no empirical data regarding this image transformation.

4.2.1.15 Rome 1960

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

For the 1960 Rome Games, information was retrieved from two articles. Both articles were in the form of commentary and cover several Games together, rather than dealing exclusively with the Rome Games. Thus, there is little information about the Rome legacies. Two facets of legacy are addressed regarding the development of the city.

URBAN DEVELOPMENT

The 1960 Olympic Games produced both new sports facilities and substantial improvements to the urban infrastructure. The Olympic sites in the north and south were linked by a new road called the "Via Olimpica" (Telesca, 2014). The South Olympic Center was later developed into a new suburb of Rome (Chalkley & Essex, 1999). The apartments of the Olympic Village were allocated to civil servants after the Games.

Additionally, a new airport was built (Telesca, 2014). Despite major investments in urban infrastructure, the Games left a poor urban legacy to Rome due to the lack of a coherent vision. Furthermore, the project focused on creating benefits not for the city's inhabitants, but for others (ibid).

ENVIRONMENT ENHANCEMENT

For the Games, the city developed a new municipal water supply system. Street lighting was improved, monuments were illuminated and numerous decorative enhancements to the city were undertaken (Chalkley & Essex, 1999).

4.2.1.16 Melbourne 1956

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

For the Melbourne Olympic Games, two commentary articles were included in the analysis. Both articles describe the physical legacies of the Games and focus on the sporting facilities and the Olympic Village.

URBAN DEVELOPMENT

The 1956 Melbourne Olympic Games left a physical legacy that subsequently caused problems (Essex & Chalkley, 1998). The Olympic pool was not opened to the public and remained under-utilized after the Games. Because of this, the pool was transformed into a Sports and Entertainment Center in 1983, after which it became a successful facility. The velodrome was demolished in 1973, since the cycling track did not conform to the specified requirements. After hosting many cycling events from 1956 to the mid-1960s, the facility was no longer utilized and was eventually closed down. However, all other facilities were well used after the Games (Woodhead, 1988).

The Olympic Village became a residential area, but also ran into difficulties after the Games. A survey in 1985 described the general maintenance of the village and its landscape as "lacking" (Woodhead, 1988). The area was occupied by new immigrants from Greece, Italy and Malta, and experienced several material and social problems (Essex & Chalkley, 1998).

4.2.1.17 *Berlin 1936*

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis of the legacies of the Berlin Olympic Games includes two commentary articles. The articles deal with the Olympic sites and infrastructure improvements.

URBAN DEVELOPMENT

The Berlin Games left substantial sporting and cultural legacies for the city. Many of the Olympic venues have been in use for over sixty years. The Olympic Stadium, the Reichssportfeld (the area surrounding the stadium) and the Waldbühne (open air theatre) have continued to host many profitable events each year and attract hundreds of thousands of visitors. The Olympic pool remains one of the city's most popular open air pools. Beyond these well-known venues are the training facilities, which are now used by sport and school groups, and the training ground for the Hertha BSC football club (Corteen, 2010). Additionally, a range of training facilities for top athletes were built, as well as a large building for the House of German Sport (Chalkley & Essex, 1999).

The Olympic Village suffered from poor maintenance during military use by the USSR, and many of the buildings decayed. Although parts of the site have been renovated the buildings continued to deteriorate due to a lack of demand (Corteen, 2010).

4.2.1.18 *Los Angeles 1932*

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

For the 1932 Olympic Games two commentary articles were retrieved. There is one overview article that deals with all Summer Games editions until 1996. The other article deals with the legacies of the 1932 and 1984 Los Angeles Games. The section on the 1932 Games focuses on the image effects of the Games, and how they helped to bring the California Lifestyle to people. Three aspects of legacy are covered in the following industries: sports, housing and culture.

These were the first Games in Olympic history that produced a profit. The surplus flowed back into the community, creating various legacies (Dyreson & Llewellyn, 2008).

URBAN DEVELOPMENT

The Los Angeles Coliseum, which was the Olympic Stadium, became the central architectural legacy of the Games. The stadium has been home to six different professional football teams and has hosted many sport and non-sporting events (Dyreson & Llewellyn, 2008). For the Games, an Olympic Village was built, which was the first Olympic Village in history (Chalkley & Essex, 1999). However, no information about its post-Games use could be found.

ENVIRONMENT ENHANCEMENT

For the 1932 Games 30,000 palm trees were planted to beautify the city (Dyreson & Llewellyn, 2008).

BELIEFS

The 1932 Olympic Games created an image of Los Angeles as a vibrant, modern city characterized by ethnic and racial harmony. The Games were presented as the marriage of film, fashion, and athletics, which helped to define the California lifestyle for future generations of global consumers. Furthermore, the Games elevated the Olympic Games to “world acceptance” (Dyreson & Llewellyn, 2008).

4.2.1.19 London 1908

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

One article dealing with the London 1908 Olympic Games was found. The article analyses the planned and unplanned legacies of the Games. Since the Games were in their infancy during this time, many legacies for the Olympic Movement were created.

URBAN DEVELOPMENT

The Olympic Stadium was the first purpose-built modern Olympic Stadium, and it left an important physical legacy for London. The plan was to demolish it in late 1908, but the demolition team did not move in. The stadium hosted various local, national and international events after the Olympic Games and remained in use until 1984. There were also infrastructure improvements during this time, for instance the London Underground system was expanded, but the Olympic Games were not responsible for any major developments. The only legacy directly attributable to the Games was the

modest Preston Road Halt, which proved popular after the Olympic Games (Polley, 2015).

POLICY AND GOVERNANCE

The 1908 London Olympic Games also left a legacy for the Games themselves. The London planners established more women's events in the program. As a result, there was a significant increase in women competing, which was important for the Olympic movement. The British Olympic Committee further worked on formalizing rules and regulations. One of the great legacies of 1908 was the attempt to collate the rules on amateurism and professionalism from as many sports as possible. Overall, a series of administrative decisions and innovations were made which have created legacies for the Olympic movement (Polley, 2015).

4.2.1.20 Further Games

For the Games between 1896 and 1928 (except for 1908) and the London 1948 Games no articles related to their legacies could be found. There is one overview article from Chalkley and Essex (1999) which describes urban development through hosting the Games from 1896 until 1996. This article also provides a little information about the above-mentioned Games, however the article only describes some changes in the cities, and it remains unclear how far these changes constitute legacies. Consequently, it is not possible to review the legacies of these Games. For the Stockholm 1912 and Helsinki 1952 Games there is only one article that deals with the legacy of the Olympic Stadiums (Bairner, 2015). Both stadia have remained in regular use up to the present day. Furthermore, they have become major sites of national and sporting heritage.

4.2.2 Winter Games

4.2.2.1 Sochi 2014

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis for the Olympic Games 2014 in Sochi includes four articles that are empirical and one source that is not empirical (Zimbalist, 2015). The results mainly draw from two articles (Azzali, 2016; Müller, 2015b) that focus on the general development of Sochi, its infrastructure, the Olympic Park, venues and tourism. The findings from these articles are well researched since all articles employ and combine several methods. Müller (2015b) conducted 51 interviews, supplemented by participant observation

and document analysis. The high number of interviews with staff from the IOC, the local organizing committees of the Olympic Games in Vancouver 2010 and Sochi 2014, and contracted consultants provides an opportunity to capture various different perspectives and insider information. Azzali (2016) conducted nine interviews, supplemented by a series of site visits with observations and behavioral studies plus document analysis. However, the studies can only reflect a short-term perspective, and thus cannot constitute an evaluation of the Sochi legacy. The interviews and site visits by Azzali (2016) were conducted in the end of 2015, and the interviews by Müller (2015b) before the Games. Although the articles agree that the Games failed to achieve almost all the legacies promised in the bid book, and sustainability was a long way from being achieved, it is, from a legacy perspective, too early to draw these conclusions.

The articles cover four facets of legacy in four different industries: city development, tourism, sport and education.

URBAN DEVELOPMENT

For the Sochi Olympic Games, huge investments were made in infrastructure. However, the benefits from these investments are limited. As far as public transport is concerned, the Sochi-Adler high-speed railway, which was the most expensive infrastructure built for the Games, is rarely used, since train transport in Sochi is not competitive with road transport. As a result, connections were cancelled (Azzali, 2016).

The new highway to the mountain village of Krasnaja Poljana was designed with excessive capacity. The road capacity of 20,000 people per hour exceeds the maximum capacity of all the resorts (Azzali, 2016; Müller, 2015b).

The new airport is also oversized. The airport is able to handle 3,800 passengers per hour at peak time, which means that air traffic would have to increase fivefold (Müller, 2015a).

The new hotels that were built around the Olympic Park and the mountain cluster suffer from low occupancy rates of around 20-25% (Azzali, 2016). During the off-season, the rate is even lower, at 8%, even for the new hotels. The high hotel room capacity, which is not needed, has led to destructive competition for survival among the hotels (Müller, 2015b).

The Olympic Park fails to attract tourists and remains underused (Azzali, 2016; Müller, 2015b). Even during peak hours, there were very few tourists at a fun fair that took place there. The sports complexes are now either closed or underutilized, and

sustainability is far from being achieved (see environmental enhancement). The former International Broadcast Centre is now empty and closed instead of being transformed into an exhibition center, as originally planned (Azzali, 2016).

Virtually none of the urban development measures correspond to the long-term needs of the local people, because of their excess capacity (Azzali, 2016; Müller, 2015a; Müller, 2015b). However, as the authors were not able to consider the long-term planning behind all the projects, it is not possible to assess whether all the constructions are really oversized, or if they will prove beneficial in the future.

ENVIRONMENTAL ENHANCEMENT

The new infrastructure had to be completed in a rush before the Games, which meant that it did not meet quality standards. Maintenance costs are very high, since things break down, and maintenance is required more urgently due to accelerated abrasion. Additionally, roads were not built with adequate flood protection (Müller, 2015b).

As far as the venues are concerned, they are not used for their designated purpose. As a result, sustainability is far from being achieved (Azzali, 2016; Müller, 2015b).

The construction for the Sochi Games left a problematic environmental footprint (Zimbalist, 2015). According to local residents, chemicals used in Olympic construction have polluted the water, and there were innumerable complaints. Furthermore, the massive construction projects destroyed local wildlife (ibid). One interviewee from the Sochi OCOG stated: "We are dealing with a pristine environment: there is some damage from construction that is irreparable" (Müller, 2015b, p. 203).

POLICY AND GOVERNANCE

For the Sochi Games, legislation for environmental protection was relaxed, resulting in a negative environmental legacy. The forest code was modified to allow for the felling of rare species of trees, and the law on protected areas was modified to allow for sports mega-events to be held there (Müller, 2015).

SKILLS, KNOWLEDGE AND NETWORKS

In 2009 the Russian International Olympic University was created as one component of a knowledge transfer program. With one campus in Sochi, the university aims to educate sport managers and to bring international scholars and students to Russia.

However, there is only one academic program (Masters in Sports Administration) and the student body is very small (Azzali, 2016).

BELIEFS

The goal of improving Russia's global image is not likely to be achieved, thanks to many critical reports in the international media during the preparations. According to a survey regarding attitudes towards Russia in selected countries, "the number of people with favorable views of Russia declined in several western countries, as well as in emerging countries like Brazil, the closer the Olympic Games drew" (Müller, 2015a). The legislation "against the propaganda of non-traditional sexual orientation to minors" also produced an international uproar and caused leaders of European states to boycott the Games. Moreover, the occupation of the Crimea and the support of rebel forces in Eastern Ukraine ruined any ambitions of changing Russia's image in the world (Müller, 2015a).

BEHAVIOR

Ermolaeva (2016) examined the effect of the Sochi Olympic Games on citizens' environmental consumption practices. Sochi residents were asked "can you tell that your lifestyle became more environmental friendly after the event?" 64% of the respondents answered "no", indicating that the majority did not change their behavior in terms of environmental issues.

4.2.2.2 Vancouver 2010

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis for the 2010 Winter Games in Vancouver includes 13 articles that are empirical and one article that is commentary. The articles offer a variety of topics and perspectives rather than focusing on any one in particular. Thus, every facet of legacy from the analytical scheme is covered. Legacies in the following industries were researched: city development, tourism, sport, events, volunteering and arts.

URBAN DEVELOPMENT

For the Vancouver 2010 Games the Canada Line, a new rapid transit line from the international airport to downtown, was built (Dickinson, Johnston & Zaiontz, 2015; Kaplanidou & Karadakis, 2010). According to Kidd (2010), the line had already reached

the ridership expected for 2013 by 2010, demonstrating its usefulness. The Sea-to-Sky highway received long-overdue safety and capacity upgrades, and the number of accidents on the road appear to have been significantly reduced.

Vancouver conducted several community projects to improve accessibility for people with disabilities, which were also sustained after the event. Additionally, three accessible playgrounds and an outdoor sport court to facilitate sport participation and activities among residents were built (Kaplanidou & Karadakis, 2010). Whistler gained a new central park and plaza as well as upgrades to its convention center. The installation of 286 km of fiber optic cable between Whistler and Vancouver provided improved telephone, TV and digital services for Whistler residents. Furthermore, three state-of-the-art weather stations were set up by Environment Canada, to help improve Whistler's mountain weather forecasts (Kidd, 2011).

In terms of housing, study results are contradictory. According to Dickinson, Johnston and Zaiontz (2015) and Kidd (2010) the Games added significantly to the region's housing stock. The former Athletes' Village has become a trendy neighborhood with 1,100 new units, of which 225 are affordable (defined as costing no more than 30% of a household's total gross monthly income). Furthermore, a new community center, day care and retail facilities were built (Kidd, 2011).

The OGI Games-time report also states that "the available data, specifically for the Vancouver Olympic Village, suggest that a housing legacy (in terms of increased floor area) was established" (OGI-UBC Research Team, 2011, p. 150). However, results from Pentifallo and VanWynsberghe (2015) are in stark contrast. The authors have shown

by almost every other measure available, no such legacy exists. The number of units created meeting the criteria for affordable or modest market housing, the original projections for social housing units, and number of SRO (single room occupancy) units indirectly subtracted from the housing supply in the years leading up to the 2010 Winter Olympic Games all point to a vastly different outcome than the one presented by VANOC (Pentifallo & VanWynsberghe, 2015, p. 277).

The Olympic Park offers a number of activities to the public, such as biathlon, cross-country skiing, ski jumping, snowshoeing, and sightseeing. During the winter, Nordic competitions are hosted there. In the summer, the park hosts sport events like cross-country races and Ironman competitions, but also social events like graduations and weddings (Davidson, 2015).

Several of the sporting facilities were converted for local use. The speed-skating track at the Richmond Olympic Oval is now a multi-sport training and competition hall and

has proven very successful (Davidson, 2015; Kidd, 2011). However, revenues were insufficient to cover operating costs (Kidd, 2011). The former Curling Center was converted into a community center with indoor and outdoor pools, sport and recreation facilities, a new rink, a library and child care (Kidd, 2011). Since 2013, the Olympic venues have also been used for public activities. The Sliding Center offers tours and rides, generating nearly \$1 million of income per year.

ENVIRONMENT ENHANCEMENT

Vancouver received a number of environmental improvements through the Games, including hydrogen buses for Whistler and fueling stations for Whistler and Victoria, and a new natural gas pipeline to Whistler. The pipeline reduced greenhouse gas emissions by 15% by facilitating the switch from propane to natural gas. Moreover, Olympic construction aimed to achieve a minimum of LEED silver standard. The Olympic Village reached LEED gold status. The neighborhood energy systems significantly reduce carbon emissions from heating the buildings, as well as cutting water consumption by 50%, through rainwater collection (Kidd, 2011).

POLICY AND GOVERNANCE

Research by Kennelly (2016) suggests that marginalized young people have not benefited from Olympic legacies, despite promises made by organizing committees. To the contrary, the study indicates that homeless young people were further marginalized by the Olympic Games.

SKILLS, KNOWLEDGE AND NETWORKS

The Vancouver Games did not succeed in achieving a volunteering legacy (Benson, Dickson, Terwiel & Blackman, 2014). According to the authors, a legacy will only occur when the required long-term learning outcomes have been identified, integrated into the training plan and delivered in an appropriate manner. However, the Vancouver volunteer training program did not meet these requirements. Moreover, their survey revealed that the volunteer database was not an accurate or effective communication tool for volunteers.

A further legacy in terms of new networks and relationships was the increased level of collaboration amongst tourism entities (Mason & Hinch, 2015).

INTELLECTUAL PROPERTY

The “National Asset Development Programme” was launched for the Vancouver Games. This program was designed as a means to achieve the strategic objective of brand building. The digital assets of the program were still being utilized in the years after the Games, constituting an important legacy (Mason & Hinch, 2015).

BELIEFS

Armenakyan, Heslop, Nadeau, O’Reilly and Lu (2012) found evidence for enhanced national pride as well as an improved image of Canada for both stakeholder perspectives researched, Canadians and Americans. According to the study, hosting the OG did contribute to an improved image and increased knowledge of Canada as a destination for Americans. Americans also reported improved attitudes towards Canadians as being more helpful and courteous, as well as in terms of the country’s technological level. Although the study was based on a representative sample, the post-Games study was conducted two months after the Games, making an assessment of the real legacy extremely difficult.

Karadakis & Kaplanidou (2012) evaluated legacy perceptions among residents of Vancouver and Ottawa. The study found that residents in both cities assessed socio-cultural, tourism and psychological legacies as satisfactory. In contrast, expected economic legacies were not satisfactory. Again, the post-Games study was conducted six months after the Games, thus the results reflect impact rather than legacy.

Promises were made that the Vancouver 2010 Cultural Olympiad would generate benefits for the arts sector on a global level. However, no evidence for such a legacy could be found. Data suggest that arts organizations that focused on a local platform and audience received some benefits. However, the Cultural Olympiad did not provide the global stage and audience that were promised (Low & Hall, 2012).

BEHAVIOR

There are three studies in the analysis dealing with the Games and their influence on sport participation. Although the studies are based on representative samples, the data are not appropriate to the purpose of the studies. The study results from Perks (2015) suggest that the Olympic Games had almost no impact on sport participation in Canada. The data show only a modest bounce in sport participation in the Vancouver area

immediately after the Games. Thus, if any trickle-down effect did occur, the effect was small, short-lived, and locally situated (Perks, 2015).

Potwarka & Leatherdale (2016) studied physical activity among young people over a two-year period. The study revealed no statistically significant changes in the rate of moderately active/active youth in Canada or the province of British Columbia. Yet, at the regional level, a significant increase in the rate of moderately active/active females from 2007–2008 to 2009–2010 was observed in the Richmond, British Columbia health region. The study concludes that trickle-down effects may in fact occur within certain communities and among particular segments of a population (Potwarka & Leatherdale, 2016). However, the authors also discuss the reliability of their data. On the one hand, they state that previous research has argued that Statistics Canada provides the most valid and reliable source of data for their type of investigation and methodological approach. On the other hand, only repeat cross-sectional data from 2007 to 2012 were available. The authors admit,

this is not the most ideal data-set to explore notions of a trickle-down effect, and future research would benefit from longitudinal and quasi-experimental data that tracks participation rates from several years prior to an event to several years after an event (ibid, p. 254).

Craig and Bauman (2014) investigated physical activity among Canadian children between the ages of five and 19 years, but found no measurable impact on physical activity from the Games. The study was based on the Canadian Physical Activity Levels Among Youth (CANPLAY) study. Overall, 19,682 children participated in the study, which provides a representative sample.

4.2.2.3 Turin 2006

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis for the Olympic Winter Games in Turin includes four articles that are empirical and five that are non-empirical. The articles deal mainly with tourism and the image of the city. The articles cover four aspects of legacy in the following industries: city development, tourism, sport and environment.

URBAN DEVELOPMENT

The urban legacy for Turin can be considered positive, and the city has gained many advantages in terms of new or improved transport infrastructure (Bondonio & Campaniello, 2006), new hotels (+31%) and improved quality of accommodation (Bondonio & Guala, 2011) and general renovation or improvement of open spaces and building

façades (Stimilli, Scitaroci & Sargolini, 2016). Buildings and museums of cultural interest were restored, which was important for preserving the city's cultural tradition (Guala, 2015). The Olympic facilities have been used for different kinds of sports, musical and cultural events. Other facilities were given to the municipality as student accommodation and social housing, or were readapted and sold as residences on the real estate market (Stimilli, Scitaroci & Sargolini, 2016). Furthermore, the Alpine districts received cabling (Bondonio & Campaniello, 2006).

As far as the sport venues were concerned, the ski-jump complex in Pragelato and the bobsleigh track in Cesana have become "white elephants" (Stimilli, Scitaroci & Sargolini, 2016). The two ice stadiums in Torre Pellice and Pinerolo remain underused, with very high maintenance and management costs. More controversial is the legacy of the Mountain Olympic Villages in Bardonecchia, Sestriere and Pragelato. They have been turned into holiday villages, but have been criticized for damaging the local economy, due to their unusual size and tourist attractions.

POLICY AND GOVERNANCE

To ensure the sustainability of the Olympic Games, innovative measures were put in place. As a result of the Italian law 285/00, TOROC had to adopt the Strategic Environmental Assessment (SEA) procedures in its project management. This means that:

"all the effects on the territory must be evaluated: either direct or indirect, overall, synergic, short and long term, permanent and temporary, positive and negative, in order to verify the environmental sustainability of the interventions for the Olympic Winter Games Torino 2006" (TOROC, 2002, p.9).

The set of indicators developed by TOROC meant that the global impact on the environment could be evaluated through every step of Olympic preparation (Furrer, 2002). However, there is no information indicating how far the SEA constitutes a legacy of the Games, or what further initiatives were undertaken.

SKILLS, KNOWLEDGE AND NETWORKS

The Games led to more collaboration between Alpine institutions (Bondonio & Mela, 2008). Furthermore, the experience of the Olympic Games was reused as a professional skill in the bidding for new events (Ferrari & Guala, 2015; Guala, 2015).

BELIEFS

The renewal of the city's image can be seen as the most important effect (Bondonio and Mela, 2008). The change has been confirmed by many surveys (Guala, 2015). A longitudinal survey among citizens of Turin and the Alpine districts revealed that the majority of respondents (70%) believed that the image of the city had improved (Bondonio & Guala, 2011). Further surveys among Italians confirm that the image of the city and its attractiveness have changed for the better. Abroad, however, although the image of Turin is better than it was in the past, its traditional image as a manufacturing city still remains (Bondonio & Guala, 2011; Guala, 2015). Auruskeviciene, Pundziene, Skudiene, Gripsrud and Nes (2010) investigated attitudes of young Lithuanians towards the image of the country and found that sympathy with Italy decreased after the Olympic Games. Their sample was quite small, however, and reflects only the perspective of young Lithuanians.

The tourism legacy from the Turin Olympic Games is a controversial aspect. Two studies looked at tourism data in terms of arrivals, visit duration and visitor numbers at the main museums, which all confirmed a positive trend (Bondonio & Guala, 2011; Dansero & Puttilli, 2010). However, the data also revealed a significant difference between domestic and foreign tourists, with a sizable drop in foreign visitors between 2006 and 2007 (Dansero & Puttilli, 2010). The average length of stay fluctuated significantly in 2009 and 2010 (Bondonio & Guala, 2011). Finally, Bondonio and Guala (2011) conclude that the trend was positive, and that cultural tourism had increased. Yet it must be admitted that, outside of the Games, the city has made substantial efforts to communicate the city's new vocation as a tourist destination. Thus, isolating the pure Olympic effect has become more difficult, and looking at tourism data alone is not an appropriate tool for evaluating a tourism legacy.

4.2.2.4 Salt Lake City 2002

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis for the 2002 Winter Games in Salt Lake City (SLC) includes four articles. Two articles are empirical and two others are commentary. Only one article focuses on the SLC Winter Games, and yet this article did not find any legacy, and contributed very little data. Most of the findings are drawn from overview articles. As a result, the

articles only cover three facets of legacy in the following industries: city development, tourism, sport and events. Generally, it should be noted that

“although the city and state government established a mechanism for supporting its Olympic legacy, ‘legacy’ was defined only in terms of the maintenance of specific facilities (both were located outside SLC) and the city itself was unable to realize an Olympic legacy” (Adranovich & Burbank, 2011, p. 840).

URBAN DEVELOPMENT

For the SLC Games, the Great Salt Lake highway network and the Interstate 15 were greatly improved. Through the Olympic Games, a light rail line was constructed, providing a new means of public transport. Additionally, the city center was considerably redeveloped and the airport was completely renovated. The number of hotel rooms in downtown SLC rose by 64% between 1994 and 2002. However, the occupation rate dropped from 74% to 60% during the same period (Chappelet, 2003). The Olympic Village was transformed into student accommodation after the Games. The number of beds available for students was increased from 1,200 to 3,600 (Davidson, 2015).

The Utah Olympic Park stages a variety of year-round activities. The park serves as an event space for local, national and international competitions. To generate visitor interest, rope courses, ziplines, Alpine slides and a rock-climbing course were built. As far as the sport facilities are concerned, many venues continued to thrive over a decade later. The Utah Olympic Oval serves as an elite training facility by day and a community center by night. The Soldier Hollow Nordic skiing area focuses on Olympic legacy through community and youth programs (Davidson, 2015). The E-Center ice rink became the home ground for the local NHL team (Chappelet, 2003).

POLICY AND GOVERNANCE

To support the legacy of the Games and manage the surplus generated by the Salt Lake Olympic Committee, the Utah Legacy Foundation was created (Adranovich & Burbank, 2011). The Foundation developed new programs to increase participation rates, and created venue memberships for youth winter sports. By providing low-cost, high-quality instruction, participation has increased from 400 to 1,500 per year (Davidson, 2015).

In March 2015, legislative support for the Olympic legacy was extended when Senate Resolution SCR9, the “Concurrent Resolution Recognizing the Importance of Utah’s

Sport and Olympic Legacy Efforts”, was passed. This resolution recognizes the importance of Olympic legacy and encourages the state to host major sporting events of all kinds in the future (Davidson, 2015).

SKILLS, KNOWLEDGE AND NETWORKS

As far as employment effects are concerned, no legacy could be found (Baumann, Engelhardt & Matheson, 2012).

BELIEFS

According to Adranovich and Burbank (2011), image is the most important intangible legacy for SLC. The city aimed to “put itself on the map” and improve its national and international recognition. In their article, they refer to several studies. However, these studies were conducted prior to the event or directly after the Games; an evaluation of legacy is therefore not possible with these data.

4.2.2.5 Nagano 1998

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis for the 1998 Winter Games in Nagano includes three articles. Two articles are empirical, one is commentary. One of the articles focuses on the development in Hakuba, which was one of the five host municipalities of the Games. The articles cover only three aspects of legacy in the following industries: city development, tourism, sport and volunteering.

Generally, the soft infrastructural legacies were the most important ones for Nagano and the other host municipalities. The hard infrastructure legacies were predominantly negative. The emergence of processual strategic planning after the Games allowed host municipalities like Hakuba to recover from the initial downturn after the Olympic Games. The soft legacies built the foundation of the learning process and enabled people to make the most of the hard infrastructural legacies.

According to Miyoshi & Sasaki (2016), the overall effects of the Olympic Games on the local economy and labor markets were very limited.

URBAN DEVELOPMENT

“The hard infrastructure constructed for the Games did not lead to a positive result” (Nakamura & Suzuki, 2017, p. 9). The sport facilities have not been much used since

the Olympics. This statement is in line with Chappelet (2003) and Zimbalist (2015), who said that the new baseball stadium, which was built for the opening and closing ceremonies, now remains empty. The ski jumps made a loss in 2006, since the costs for maintenance were higher than the revenue of the facility. The cross-country facility also recorded a loss in 2007, although it was utilized in the off-season for other sports like mountain biking (Nakamura & Suzuki, 2017).

As far as the transport infrastructure is concerned, a high-speed train line from Tokyo to Nagano was built (Chappelet, 2003). Additionally, an unused bus terminal was reopened as a new bus terminal and tourist information center (Nakamura & Suzuki, 2017).

SKILLS, KNOWLEDGE AND NETWORKS

In terms of skills, knowledge and networks, important legacies for Nagano were reported, including in particular English-language skills, shared knowledge and social networks. Through the Olympic Games, the communities developed competency in serving customers in English (Nakamura & Suzuki, 2017). However, there is no empirical data to back up these assumptions.

BELIEFS

No positive results for the international promotion of the “brand” of Nagano were reported (Nakamura & Suzuki, 2017). The authors state that the number of foreign visitors increased slightly in the aftermath of the Games, but quickly dipped afterwards. For the Japanese people, a legacy of community pride could be observed. This pride may have been the very foundation of people’s efforts to turn the negative legacies into something positive (ibid).

BEHAVIOR

According to Chappelet (2003), the population of Nagano became more open to foreign visitors as a result of the Games. Additionally, the Games initiated a culture of volunteer work in the region (ibid). Again, empirical evidence for these claims is missing.

4.2.2.6 Lillehammer 1994

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

For the 1994 Winter Olympic Games in Lillehammer four articles were included in the analysis. Two articles are empirical, two are commentary. The articles do not focus on specific topics. Two articles attempt to evaluate the long-term impacts of the Games by looking at different industries, for instance tourism or events. Although the Lillehammer Games were the first “green” Games, little research exists regarding this aspect. The articles cover two facets of the legacy in four different industries: city development, sport, events and tourism.

Overall, some positive legacies were detected for the Lillehammer Games. However, the long-term impacts are very marginal since the growth in Lillehammer is to a large extent based on reallocation of resources within the country. The Olympic Games were only a temporary phenomenon, although they accounted for significant growth in the tourism industry and the creation of around 400-500 new full-time jobs (Spilling, 1998).

URBAN DEVELOPMENT

Lillehammer received major infrastructure improvements for the Games (Spilling, 1998). All the road access routes were greatly improved. The former media center was transformed into a public school (Chappelet, 2003). Additionally, a number of high quality facilities were built. Lillehammer has hosted over forty major events since 1994 (Spilling, 1999). Thus, the venues were utilized after the Games, although not much concrete data is available. According to Chappelet (2003), the ski jumps have not been used regularly, whereas the Hamar hall has been satisfactorily used for trade fairs, concerts and sport competitions.

The hotel industry was significantly expanded (Spilling, 1998). As a result, Spilling (1999) estimates that from 1988 to 1998, tourist demand for the Lillehammer region grew, in a sustainable way, by 68%. However, Teigland (1996) found that tourism growth was in many ways lower than expected. As a result, there was a clear overcapacity of commercial accommodation supply afterwards. However, since this study was published only two years after the Games, it reflects an impact rather than a legacy.

Both authors try to assess the tourism legacy by using a top-down approach, thus making it impossible to isolate the purely Olympic effect. Spilling (1998; 1999) tries to consider causality in his studies. His research approach “has been based on in-depth

knowledge of development processes in the region, and on continuing efforts in interpreting causal effects, partly just through observation, partly by discussing the development with the actors involved” (Spilling, 1998, p. 107). To tackle the problem of attribution he suggests a model developed by Storey (1990). However, this model is also based on a top-down approach that leads to methodological issues.

ENVIRONMENT ENHANCEMENT

For the Lillehammer Games, a recycling program was developed for the entire region. The program succeeded in recycling or composting 70% of all waste generated. Further guidelines for the Games focused on the use of natural materials wherever possible, or on energy conservation in heating and cooling systems. The Cavern Hall is one example that saves about \$20,000 annually in heating costs, because it was built inside the mountain. Moreover, a stipulation was made that the venues must harmonize with the surrounding landscape (Chernushenko, 1994).

4.2.2.7 Albertville 1992

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

The analysis for the 1992 Olympic Games in Albertville includes four articles that are all commentary. Two articles deal exclusively with the Albertville Olympic Games; one article summarizes legacies of Olympic Winter Games. The articles deal with the urban development of Albertville and the Savoie region as well as with the sporting facilities. The articles cover four facets of legacy in five different industries: city development, tourism, sport, events and arts.

URBAN DEVELOPMENT

The major transport legacies for the Albertville Games were the highway from Chambéry to Albertville, plus the extension via a rapid road to Moutiers and the TGV line to Bourg Saint-Maurice. The new Olympic infrastructure greatly enhances access to the Tarentaise region (Terret, 2008). However, this also led to a considerable increase in traffic and traffic congestion on the highway at Albertville (Chappelet, 2003).

Numerous public facilities were built or modernized e.g. a new hospital, international meeting center, and renovation of the post office area (Chappelet, 2003; Charmetant, 2003). Moreover, an Olympic Museum (Maison des Jeux) as well as the Dôme theatre were built, leaving a cultural legacy for Albertville.

The Olympic Village was based in the spa resort of Brides-les-Bains, where many improvements were implemented for the Games. Every hotel was renovated, a new thermal complex and accommodation was created, and a cable car between Brides-les-Bains and Méribel was constructed. Today, the resort enjoys tourist activity all year round (Chappelet, 2003; Charmetant, 2003).

The sport facilities were still working (apart from the speed skating ring) ten years after the Games (Charmetant, 2003). Charmetant (2003) underlines his statements with figures referring to the use of facilities (e.g. number of ski jumpers using the jumps, or number of lessons held for school groups, clubs and the public in the “Halle Olympique”). Yet it remains unclear where these figures come from, and how reliable they are. For instance, it was reported that the ski jumping installations were used for training purposes by 1,700 young skiers per year (ibid). Figures that are more current do not exist. Although Val d’Isère is a popular skiing area in France, the Belvedere run, created for the Albertville Games, did not see any competition after the Games (Chappelet, 2003). However, this information has not been updated since the FIS Alpine World Ski Championships were hosted there in 2009. Today, Val d’Isère is a regular stop on the World Cup circuit.

ENVIRONMENT ENHANCEMENT

Positive legacies can be reported in terms of the environment. First, industrial wasteland was rehabilitated for certain sites at the 1992 Albertville Games, and secondary sewage plants were built (Chappelet, 2003).

SKILLS, KNOWLEDGE AND NETWORKS

According to Chappelet (2003) a culture of volunteer work was initiated in the Albertville region after the Games.

Hosting the Games also enabled Albertville and the Savoie region to attract further major events (e.g. World Cycling, Rowing, Handball, Canoe Slalom Championships, a stage of the Tour de France) (Chappelet, 2003).

BELIEFS

The image of Albertville itself was not improved significantly through the Games. On the contrary, according to Terret (2008) it was even damaged by the declarations of environmentalist groups during the preparation phase of the Games.

The long-term impact on tourism was somewhere between non-existent and very modest (Teigland, 1996).

4.2.2.8 Calgary 1988

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

For the 1988 Olympic Games in Calgary, three articles, of which two are commentary and one is empirical, were identified. The focus of the commentary papers is on Olympic-related facilities and how they were used after the Games. The empirical paper investigates the impact of the event on host region awareness. The legacy aspects of urban development and beliefs are addressed by these articles.

URBAN DEVELOPMENT

According to West and Warren (2003, p. 175), “each of the facilities and venues developed for the 1988 Winter Olympics remain in use today, largely for sport purposes”. Calgary has become a center for winter sport athletes and most national and winter sport associations have moved their headquarters to Calgary. However, the demand on Olympic venues for training or competitions was not high enough to operate them solely for that purpose. Consequently, many sport sites were marketed for public use (Hiller, 2006).

Canada Olympic Park has expanded from its initial 200 acres to over 600. The park has become the third most popular ski area in the province, and a major international winter sport training facility for grassroots sports, and serves as a major tourist attraction (Warren & West, 2003). In summer, there are weekly summer sport camps, mountain bike racing, tours, etc. However, the park is privately owned, and public access is fee-paying (Hiller, 2006). The Olympic Plaza has become “a very important urban legacy of the Olympics because of its role as a central city gathering place” (Hiller, 2006, p. 328). The Plaza, which is located in downtown, provides open space for leisure and community celebrations (ibid).

BELIEFS

Ritchie and Smith (1991) examined the impact of the Olympic Games on host region awareness by using annual data from 1986 to 1989 from 20 centers in the United States and Europe. The results revealed that the Olympic Games dramatically increased levels of awareness and significantly modified the image of Calgary. However,

data were collected up to just one year after the Games, thus making it impossible to assess the real legacy. Furthermore, the authors address the issue of the value of any increased awareness since “it is not immediately obvious how this will translate into increased visitation levels, tourism receipts, and/or other form of economic development” (Ritchie & Smith, 1991, p. 9).

According to Teigland (1996), the long-term impact on tourism was somewhere between non-existent and very modest.

4.2.2.9 Sarajevo 1984

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

Two articles dealing with the legacy of the Winter Games in Sarajevo were found. One article is a short photo-essay, showing pictures of how some of the sport facilities look today (Walker, 2012). Further information was retrieved from an overview article by Chappelet (2003). The articles address only the facet of urban development.

URBAN DEVELOPMENT

For the Sarajevo Games, the airport was completely renovated. The Olympic Village became a subsidized housing project. The Olympic Museum is closed today (Chappelet, 2003).

Most of the Olympic facilities were destroyed by the war. The bobsleigh / luge run was used by the army as a kind of trench during the siege. The building for commentary teams and judging panels for ski jumping became a UN checkpoint. Today it is a shanty and no longer in use. The ski fields, however, are still in use and popular among locals and tourists from elsewhere in the former Yugoslavia (Walker, 2012).

4.2.2.10 Lake Placid 1980

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

For the Lake Placid Winter Games, three articles were summarized. One article deals exclusively with the legacies of the Lake Placid Games, and two are overview articles. The articles cover three facets of legacy in the following industries: sports, events, tourism, and culture.

URBAN DEVELOPMENT

According to Chappelet (2003), the Olympic Winter Games in Lake Placid represent one of the most positive cases in terms of post-Games use of sporting facilities. Many facilities from the 1932 Winter Games were still intact. Thus, for the 1980 Games, all existing facilities were refurbished, and only a new Skating Oval was built (Essex & Chalkley, 2004). After the Games, Lake Placid succeeded in setting up national training centers. At the Winter Games in Turin in 2006, 88% of the U.S. team had gone through training at Lake Placid at some time during their sports careers (Zimmerman, 2007). The Winter Games were important for Lake Placid to prevent obsolescence as a winter resort in the USA. A new Olympic Museum installed at the main ice rink, leaving a socio-cultural legacy. The Olympic Village became a prison after the Games (Chappelet, 2003; Zimmerman, 2007).

SKILLS, KNOWLEDGE AND NETWORKS

Zimmerman (2007) states that the volunteer spirit is still alive and well in Lake Placid. There is a large cadre of local volunteers who work for major events each year. Through hosting the Games, Lake Placid also gained knowledge of how to host major national and international competitions, which include 15 world championships, over 65 World Cup competitions and summer events. Moreover, the 1980 Games benefited from the skill, expertise and confidence gained during the 1932 Games, which had likely trickled down over the years (ibid).

BELIEFS

The ability to attract major sport events was also a result of Lake Placid's reputation. When Lake Placid had its 25th anniversary year in 2005, Lake Placid and the names of all the facilities appeared in 1,602 articles reaching 81.3 million people (Zimmerman, 2007). Tourism has more than doubled, and Lake Placid has become a four-season resort.

4.2.2.11 Innsbruck 1976 & 1964

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

In this review, the Innsbruck Winter Games of both 1976 and 1964 are summarized, since there is very little information about the legacies of both Games editions. There

are two overview articles, which address the Innsbruck Games in a commentary manner. The articles focus on changes related to infrastructure and facilities.

URBAN DEVELOPMENT

For the Innsbruck Games in 1964, the first section of the Brenner highway was opened. The Brenner highway – the “indirect” legacy of the 1964 and 1976 Games – has become a highly used transit route between the north and south of Europe (Chappelet, 2003).

Olympic Villages were built for both events, since the village built for the 1964 Games became a residential suburb after the Games, and was therefore unavailable for 1976. A new Olympic Village was built on an adjacent site, but its legacy is unclear. There is only the information that, in retrospect, the organizers felt that accommodating athletes in hotels might have been preferable from a cost, security and transport perspective (Essex & Chalkley, 2004).

The sports facilities from 1964 were re-used in 1976 (ibid). The ski jump became a symbolic site for Innsbruck, which organized other events there, for instance concerts (Chappelet, 2003).

SKILLS, KNOWLEDGE AND NETWORKS

The 1964 Innsbruck Games were also important for Austrian businesses, especially those related to ski equipment (Essex & Chalkley, 2004).

The long-term impact on tourism was somewhere between non-existent and very modest (Teigland, 2006).

4.2.2.12 Sapporo 1972

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

There are two overview articles, which address the Sapporo Games in a commentary manner. The articles focus on changes related to urban development.

URBAN DEVELOPMENT

For the Sapporo Games, there were extensions to two airports, 41 new or improved roads (213 km), improvements to the main railway station, and a new rapid transit system (45 km). The construction of the rapid transit system had already been started

by the City, but could now be completed with government funding (Essex & Chalkley, 2004). New western-type hotels were built, as well as various public constructions and underground shopping malls. The city also took advantage of the Games to develop a regional, centralized heating system. After the Games, most of the Olympic facilities were abandoned (Chappelet, 2003).

4.2.2.13 *Grenoble 1968*

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

For the Grenoble Games in 1968 two articles were reviewed. Both articles are overview articles, and thus do not deal with the Grenoble Games exclusively. Three aspects of legacy are addressed in the industries of city development, sports and media.

URBAN DEVELOPMENT

Grenoble received major investments in urban infrastructure, completely transforming the city into a regional capital. Several districts were greatly transformed or even built from scratch. Two new airports, at Saint-Etienne-de-Saint-Geoirs and Versoud, were built, as well as a new train station, town hall, cultural center, police station, exhibition ground, fire station, hospital etc. (Chappelet, 2003). The Olympic Village was subsequently used as an 800-room university hall, a 300-room hostel for young workers and a tower block with 52 apartments (Essex & Chalkley, 2004). The aim of the Olympic constructions was to decentralize the region and support economic growth. The highway link from Grenoble to Geneva served as a catalyst for the regional economy and helped to transform the city into a major conference and university center (ibid). However, the urban development was accompanied by a long-standing increase in local taxes, and consequently the legacy varies (Chappelet, 2003).

Regarding the sport facilities, the two ski jumps were demolished at the beginning of the 1990s due to a lack of use and maintenance. The downhill runs have long been abandoned for competition use. Running the huge ice palace was difficult after the Games. However, there is no information about what this latter statement exactly means. Overall, most of the Olympic facilities were abandoned after the Games (ibid).

INTELLECTUAL PROPERTY

For the 1968 Games, the public broadcaster ORTF converted its network and equipment to color television (Chappelet, 2003).

SKILLS, KNOWLEDGE AND NETWORKS

The Grenoble Games developed cross-country skiing in France (Chappelet, 2003).

4.2.2.14 Oslo 1952

GENERAL DISTRIBUTION OF ARTICLES AND CORE LEGACIES/TOPICS

Information about the legacies of the Oslo Games were retrieved from two commentary overview articles. There is little information about the structural changes related to the Games.

URBAN DEVELOPMENT

For the Oslo 1952 Games investments were made in transport infrastructure such as roads, bridges and ski lifts. Oslo was also the only host before 1960 to build an Olympic Village, with planned post-Olympic uses such as student residences, a hospital and an old people's home (Chalkley & Essex, 2004).

The ski jumps became a symbolic site for the city. The Ski Museum at the foot of the jump was the precursor of subsequent Olympic Museums (Chappelet, 2003).

BELIEFS

According to Chappelet (2003) Norway used to Games to develop its image as a country favoring peaceful cohabitation, due to the agreements between Oslo and Israel and Palestine.

4.2.2.15 Other Games

For the Games between 1924 and 1948, the 1956 Games in Cortina d'Ampezzo and the 1960 Games in Squaw Valley, no or very little information about their legacies was found. There is one overview article by Chappelet (2003) which gives an overview of the Winter Games legacies. Another article by Chalkley and Essex (2003) focuses on the infrastructural legacies of the Winter Games between 1924 and 2002. The above-

mentioned Games receive little attention in these articles and their legacies are addressed rarely or not at all. Consequently, it is not reasonable to review these Games editions individually.

4.3 Reviewing and mapping of Olympic Games legacies according to facets of legacies

URBAN DEVELOPMENT

The facet of urban development has been researched by most of the studies. Annex 2 shows that urban development was considered for every Games edition by the studies included in this review. Studies considering urban development most often deal with transport legacies as well as sporting venues built for the Olympic Games. Regarding transport legacies, Kassens-Noor (2012) categorizes six common transport legacies for Olympic Games between 1992 and 2012 and argues that transport legacies of the Olympic Games are similar across host cities. These legacies are: 1) airport improvement, 2) new and revitalized parks, 3) new high-capacity transport modes, 4) additional road capacity, 5) advanced intelligent transport systems, and 6) new or improved airport-city-center connection (ibid, p. 394). The results of this review confirm these categories for many other Games editions, too. However, many legacies are city-specific (Gratton & Preuss, 2008) and especially early Olympic Games editions did only confirm some of these categories due to the smaller size of the Games (see table 3). Generally, the level of change has tended to increase over time as the Olympic Games have grown in size. This development often caused problems for the cities since planning for the Olympic Games did not measure sufficiently the potential for vast urban changes which should continue after the Games. Furthermore, constructions and capacities of roads or public transport are oversized to handle crowds during the Games but they do not meet the requirements of the host city residents.

Besides these transport legacies, new sporting infrastructure as well as new housing facilities were detected as the main legacies in this facet, however, both fields are discussed controversial in literature. In terms of housing new housing opportunities were created mainly by transforming Olympic Villages to urban districts. Yet, construction for the Olympic Games also came along with resettlements and loss of housing. During the whole history of the contemporary Olympic Games, no city could host the event

without building new sporting venues. However, for most of the hosting cities, starting with the Melbourne Games in 1956, problems concerning the usage of the venues after the Olympic Games could be detected. The analysis found eight hosting cities with a negative sporting legacy, i.e. venues built for the Games remained empty or underused after the Games (Sochi 2014, Torino 2006, Nagano 1998, Sarajevo 1984 (venues also destroyed by the war), Sapporo 1972, Grenoble 1968). For other hosts controversial information exists (Beijing 2008, Montreal 1976) or problems with the sporting legacy (venues were first not used but after some years they turned popular) were reported (Athens 2004, Sydney 2000). However, empirical data to support these evaluations are missing as well as methods to measure if a venue is successful or not.

ENVIRONMENT ENHANCEMENT

Legacies in the facet of environment enhancement have gained importance in the academic field during the last years starting with the Sydney Olympic Games (see annex 2). Before the Sydney Olympic Games, the Tokyo Olympic Games in 1964 are the only ones where more than two articles related to environmental legacies exist.

Measures to create environmental legacies that were reported most often belong to the building and installation of wastewater treatment facilities (London 2012, Beijing 2008, Albertville 1992 and Tokyo 1964) and sewage systems (Athens 2004, Barcelona 1992). Other important legacies occurred through the regeneration and restoration of waterways and water systems (London 2012, Beijing 2008, Sydney 2000, Seoul 1988, Tokyo 1964). Cities also undertook measures to develop and improve the water supply system (1964, 1960) or reduce water consumption (London 2012, Vancouver 2010). Other cities were able to reduce greenhouse gas emission through the renewing of their bus fleet (Rio de Janeiro, 2016, Beijing 2008). Furthermore, cities built energy efficient and eco-friendly buildings and venues to reduce carbon emissions (Beijing 2008, Vancouver 2010, Sydney 2000, Lillehammer 1994). However, the consequences of these measures are often limited since they were installed for only one suburb, the Olympic Village or some venues. Additionally, empirical evidence for the consequences, hence the real legacy of these measures is lacking.

For three Games editions, environmental damage caused by constructions for the Olympic Games is reported (Rio de Janeiro 2016, Sochi 2014 and Montreal 1976).

POLICY AND GOVERNANCE

The analysis for this facet revealed that legacies in terms of policies and governance systems are mainly city-specific. Policies that were launched for the Games and remained after them belong to the areas of sport (25%), socially excluded groups/homeless people (19%), politics (13%), security (13%), food (13%) and environment (13%). To evaluate the real legacies of these policies, we need to look at the consequences resulting from these policies. However, for many policies it remains unclear since studies only mention the establishment of a policy but no research was undertaken to investigate their effects. For some policies, positive legacies could be observed (e.g. the homeless protocol was established for the Sydney Olympic Games and provides a long-term form of legal protection for homeless people). There are, however, also policies that entailed negative consequences (e.g. legislation for environmental protection was relaxed for the Sochi Games, resulting in a negative environmental legacy). For many other policies their real consequences, thus their legacy remains unclear since articles only mention the establishment of the policy.

SKILLS, KNOWLEDGE AND NETWORKS

This facet comprises legacies in terms of new partnerships and networks, both on a national (London 2012, Vancouver 2010, Athens 2004, Torino 2006, Barcelona 1992, Grenoble 1968, Innsbruck 1964) and international (Beijing 2008, Seoul 1988, Mexico City 1968) level. Furthermore, cities and people could benefit from new skills (e.g. English-language skills or professional skills) as well as shared knowledge and productivity (London 2012, Sydney 2000, Nagano, 1998, Los Angeles 1984, Munich 1972).

The legacy of the expertise to bid for and host future (mega) events was reported for five Olympic Games editions (London 2012, Beijing 2008, Torino 2006, Albertville 1992 and Lake Placid 1980). It could be suggested that many other hosting cities benefitted from this experience; however, a valuable legacy only occurs when the knowledge and expertise are used.

Volunteering and its legacy is a big issue related to Olympic Games. The studies included in this review provide mixed results. For four Games editions (Nagano 1998, Albertville 1992, Seoul 1988 and Lake Placid 1980) a positive volunteering legacy was reported but not measured. For the Sydney Olympic Games, results are mixed whereas for two other Games editions (2012 and 2010) a positive volunteering legacy

was neglected. Generally, it must be added that a volunteering legacy can be multifaceted and there is no study evaluating the volunteering legacy using a holistic approach. In terms of education, two countries (Greece after Athens 2004 and Russia after Sochi 2014) have started to implement new study courses.

INTELLECTUAL PROPERTY

Legacies of intellectual property were addressed by a little number of studies. Legacies in this facet are related to intellectual property that was developed for the Olympic Games themselves and the sporting industry (37%) (e.g. the sponsorship model developed by the organizing committee for the 1984 Los Angeles Olympic Games which was used essentially used by every Olympic organizing committee after 1984). The majority of studies, however, deal with legacies of intellectual property related to other industries (63%) (e.g. the new ISO 20121 standard developed by London 2012 to ensure and improve sustainability of the event as well as event related activities).

BELIEFS AND BEHAVIOR

Most of the studies belonging to this facet investigated if or how the image of the city or nation changed after hosting the Olympic Games. Study results reveal that 73% of the studies report a positive impact on the image for both, national and international stakeholders. The improved image enabled cities and countries to attract more tourists in the aftermath. Another 14% of the studies found no impact on the image, whereas other 14% showed that the image of the city or nation was damaged.

Other studies in this facet investigated the perceptions of host or non-host residents towards Games legacies. 33% of the studies revealed that positive perceptions are outweighing the negative ones and another 33% showed that respondents perceived more negative than positive legacies. For the other 33% results were mixed, i.e. perceptions of positive and negative legacies are balanced.

However, it must be added that study quality in this field is often low or studies are not able to evaluate legacy since data collection was short after the event, which is not appropriate according to the definition of legacy.

Studies focusing on behavioral changes most often researched if there is a legacy of enhanced sport participation. However, the systematic review from Weed et al. (2015) concludes that there is no empirical evidence for an enhanced sport participation as a result of hosting the Olympic Games. Again, studies are often struggling with data

quality and they neglected the problem of causality, thus they did not consider if there is a causal relationship between the Olympic Games and sport participation.

Other studies in this field reported that people became more welcoming and more open to foreign visitors because of the Olympic Games. However, empirical evidence for this assertion is missing.

5 Measurement

5.1 Challenges and methodological issues

Measuring mega-event legacies is challenging for several reasons: 1) legacy as a retrospective concept, 2) measuring intangible legacies, 3) the same legacy affects different stakeholders differently, 4) distinguishing the net vs. the gross legacy, 5) difficulty of isolating an event legacy from non-event-related city development 6) evaluating the legacy effect over time, 7) measuring something relatively small in terms of the overall economy.

- 1) In recent years legacy has been seen a retrospective concept, something that is created or happens after the event. With this conceptualization, event organizers and researchers only focused on legacy after the Games. However, measuring event legacy requires a baseline assessment to evaluate the changes. To measure sport participation, for instance, participation figures are necessary for the time when the city announces its bid. It is not possible to start such an evaluation sometime during the bidding phase or shortly before the Games.
- 2) Sport mega-events account for many intangible legacies, which are harder to quantify (Li & McCabe, 2013).
- 3) A general evaluation of legacies as positive or negative is not possible since stakeholders are affected differently (Leonardsen, 2007). Hence, studies must define the stakeholder perspective it is taking (Preuss, 2007). Most of the studies fail to define this perspective.
- 4) The “net” legacy has to be distinguished from the “gross” legacy. Without hosting the event, alternative investments would have been made. These alternative investments would create other legacies. These opportunity costs are often missed in discussion but must be considered (Preuss, 2007).

- 5) To measure the legacy of the Games it is necessary to isolate an event legacy from non-event-related city development. Structural changes stimulate economic activities, social change and environmental improvements only indirectly. Consequently, legacy cannot be identified in isolation from the general development of the city (Preuss, 2015).
- 6) To assess event legacy properly, longitudinal studies are necessary. However, the further we move away from the event, the more difficult it becomes to attribute effects to the actual event (Leonardsen, 2007).
- 7) The effects of a mega-event like the Olympic Games are relatively small in terms of the overall economy. Thus, changes induced by the Olympic Games cannot be seen in measures such as GDP, for instance.

Thus, any evaluation of legacy is likely to be partial, only covering certain aspects, and inconclusive due to the difficulties of measurement.

5.2 Methods used in legacy studies

The challenging nature of measuring legacies becomes obvious when looking at the articles analysed and the methods used. The analysis in chapter 4.1.2 shows that the majority of the articles are empirical, and hence legacy might be measured. However, most of the articles fail to really measure legacies, and if they do so, the reliability and validity of the results is often doubtful due to the obstacles mentioned above. The following table summarizes the methods used by the studies that are included in this review.

Table 1: Methods used by studies included in the analysis⁶

Method	Approach
Survey → comparison pre/post Games	bottom-up
Document analysis	bottom-up
Data collection → e.g. number of visitors for Olympic Park or sport facilities, stadium, number of events, number of jumps from a jump	bottom-up
Secondary data / desk research → e.g. Eurobarometer survey data, OGI data	bottom-up
Stadium Utilisation Index SUI = (number of events x average attendance) /capacity	bottom-up
Ecological Footprint analysis	bottom-up
Environmental Input-Output modeling	top-down
Difference in difference approach	top-down
Gravity model of trade, to measure the impact of mega-events on tourist arrivals / effect on trade flows → top-down	top-down
synthetic control method → top-down	top-down
Chow test → top-down	top-down
Percentage trend analysis → top-down	top-down
Observations	bottom-up
Membership rate analysis → effect on participation rates?	top-down
PARA instrument = Physical Activity Resource Assessment	bottom-up

Many studies analyzed for this review struggled with methodological issues when trying to measure legacy. One problem refers to the usage of a top-down approach. This problem will be outlined by using the example of tourism. Tourism is one of the foremost legacies used to justify investment in hosting Olympic Games. Many studies try to measure tourism legacies by looking at tourism figures like tourist arrivals or the average number of overnight stays. Further methods for measuring tourism legacies revealed in the analysis are the difference-in-difference approach, gravity models of bilateral tourism flows and the synthetic control methodology. These methods are all top-down methods, which are problematic and inappropriate for measuring tourism legacies since they are not able to isolate event-related changes from general metropolitan development (Preuss, 2007). Demir et al. (2015, p. 816) also underline this problem:

“The reason why the researchers cannot see the expected results is because in this rapidly evolving world the cities and the countries have already

⁶ Methods that are shaded in grey are explained in the annex rather than in this chapter since they use a top-down approach.

been working to improve their tourism potentials through a variety of interesting and creative ways. [...] Also visual and the internet technology and also transportation means have evolved very rapidly, thereby creating a new way of life for the people especially after 2000. With the help of this new way of life which empowered people, it became very easy to travel and explore the whole world.”

Significant growth in tourism is considered one of the most important legacies of the 1992 Barcelona Games (Kennett & Moragas, 2006). However, after the Games the city continued to improve its international positioning to attract leisure and business tourism (ibid). Consequently, it is not possible to attribute growth in tourism solely to the Games, and these methods are highly error-prone (Preuss, 2007; for more detailed explanation of the weaknesses of the top-down approach see also Preuss, 2007). To overcome these obstacles a bottom-up-approach is likely to be the most appropriate manner (Preuss, 2007). A bottom-up-approach considers all structural changes due to the event. The report will therefore focus on methods that are suitable for measuring structural changes in each facet of the legacy analytical scheme. Thus, methods using a top-down approach will be excluded from this point.

5.3 Addressing evaluation issues and questions

5.3.1 Additionality

Evaluations must expressly consider additionality, in order to assess the difference between the gross impacts and the net impacts, and thus to assess the true value of a project.

“The key to accurately measuring legacy, [...], is to focus on the additionality of activities attributable to the Games through a comparison of Games-related initiatives with the opportunity cost of the impacts that might have been secured from investments in alternative programmes had the 2012 Games not been awarded to London” (Weed 2014, p. 107).

It is central to the evaluation process to assess how much the intervention has been able to change behaviour, so that there are additional outputs and outcomes that would otherwise not have been generated without the intervention. Thus, all evaluations need to be built around at least one appropriate counterfactual. To isolate the additionality of the identified impacts, it is proposed to consider “deadweight”, “leakage”, “displacement” and “substitution” and “multiplier” effects, against the establishment of a baseline before the policy intervention had been introduced (Henry, 2016; HM Treasury, 2011). The terms are explained as follows:

- Deadweight: outcomes that would have happened anyway without reference to the policy intervention introduced. Thus, these outcomes have to be excluded from any evaluation of net impact of the policy.
- Leakage: the extent to which the gross impact of benefits generated and intended for a particular group, region or country incorporates beneficiaries from other groups, regions and countries. An example here might be where the UK's coach development system to train coaches at elite level produces coaches who subsequently take up employment with teams from other countries.
- Displacement: when new provision displaces other activities or services that had previously been supplied.
- Substitution: when consumers of a service or beneficiaries of a project simply substitute the new service provision for what they had been previously using or benefiting from.
- Multiplier effect: the extent to which direct benefits from an intervention trigger further additional indirect benefits. For example, attracting a family member to a jogging club results in other family members participating informally in jogging.

The problem of additionality is addressed in the evaluation framework for the London 2012 Games (e.g. DCLG, 2010; DCMS, 2009; DCMS, 2011). However, the issue of additionality was only considered in the conceptualization of the evaluation framework, and mostly not applied to the real evaluation (Henry, 2016). None of the other studies analyzed for this review considered additionality, and thus measure only the gross legacy, not the net legacy.

DCMS (2009) suggests three different techniques to determine the impact of the additionality issues on the reported outcomes:

- Undertaking a specific research study on the additionality effects using primary and secondary sources. However, this would be expensive and only justifiable for the largest evaluations.
- Conducting a survey of beneficiaries and posing specific question which ask them to rate the legacy. This should be done alongside the quantitative assessment of legacy, and the results applied to generate net legacy.
- For small evaluations, it is recommended to use benchmarks for additionality adjustments from other projects or external sources (DCMS, 2009).

Regarding the counterfactual, Henry (2016) distinguishes between the policy counterfactual (what would have been provided if the Games had not been being staged) and the outcome counterfactual (how many people would have been participating in sport if the Games had not been hosted). The counterfactual case can be assessed at three levels: alternative scenarios, benchmarks and baselines (for more information see DCMS, 2009, p. 43). However, policy counterfactual was not pursued in the majority of the London 2012 project evaluations (Henry, 2016).

5.3.2 Valuing legacies

Another issue relates to the value of legacy. Where possible, legacies should be expressed in monetary terms so that their value can be calculated. In a number of cases (such as employment), market values will be available. If there is no market value available, new approaches must be applied for valuing the legacies.

The preferred method for valuing legacies is the Contingent Valuation Method (CVM) (HM Treasury, 2011). Contingent Valuation surveys try to estimate people's willingness to pay or willingness to accept a project's outcomes, and thus the legacies. The willingness to pay is the maximum amount of money an individual is willing to give up in order to receive a good. The other way round, willingness to accept, is the minimum amount of money an individual would need to be compensated to renounce or give up a good. Legacies such as community pride, transportation, sanitation, health, education, and certain aspects of environmental quality can be measured using CVM (Barghchi, Omar & Aman, 2009).

5.4 Methods for each facet of legacy

The subsequent chapter attributes the methods identified in the narrative synthesis to the different facets of legacy.

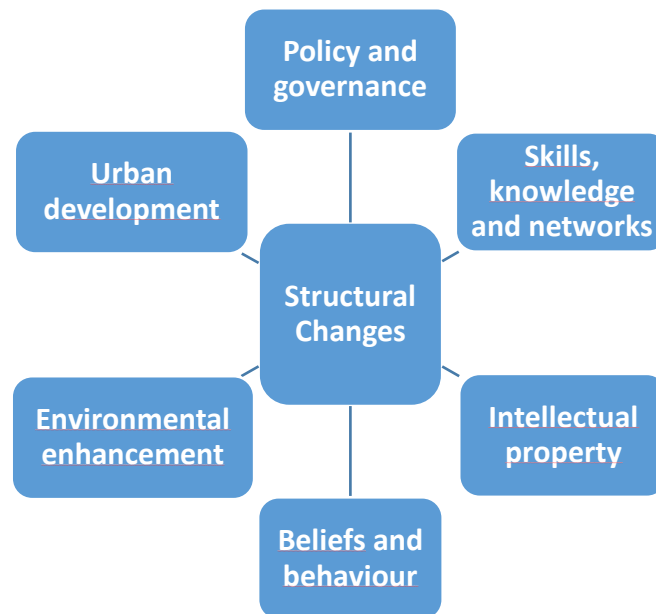


Figure 7: Facets of legacy (repetition)

URBAN DEVELOPMENT

For the legacies in the facet of urban transformation, some interesting approaches exist. Kassens-Noor (2015) suggests new measures. Traditionally, infrastructure legacies have been measured in kilometers of created or refurbished streets, metro, bus or rail lines, etc. These purely quantitative measures should be replaced with goal-oriented transportation metrics (Kassens-Noor, 2015). The pure measurement of kilometers cannot determine the value of the legacy. In Sochi, a large number of new kilometers of transport networks were built; however, the new infrastructure is oversized and rarely used. Consequently, it is not important how many new kilometers were built or renovated, but how useful the new infrastructure is for the population. To meet this demand, Kassens-Noor (2015) provides a list with new indicators. However, she also adds that the list is incomplete and only a starting point for discussion on how to create a valuable legacy metric. Future host cities will also have to develop new metrics according to their specific goals and city vision.

Tangible legacies

- New cycling/walking paths: miles traveled
- New and upgraded national/regional/local roads: average vehicle miles traveled (VMT)
- New interchanges and upgraded signaling systems: reduction in number of crashes & reduction in travel time for host city commuters

- Transport management center: reduction in emergency and incident response times and % of capacity used during daily operations
- New or upgraded metro/tram/suburban rail: increase in ridership and CO₂ reduction & operational costs

Intangible legacies

- Transport image creation: users' perception surveys
- Increase in experience for future mega-events: bids submitted/bids won
- Improvement in careers and personal development: satisfaction surveys
- Knowledge transfer through academies and private companies: number of publications & number of times used/referred to for other events
- Change in travel habits: % change in public transit use according to individual modes
- Road congestion relief: average reduction in travel time for host city commuters (Kassens-Noor, 2015, p. 140)

Further indicators were drawn from the Evaluation Framework for the London 2012 Olympic and Paralympic Games Impacts and Legacy. They suggest the following indicators to evaluate Olympic-related structural changes:

- Access to parkland
- New (affordable) housing
- Houses refurbished
- Disability access points in the Olympic Park (DCMS, 2009)

The utilization of (sport) facilities is another important aspect in the facet of urban development that requires meaningful indicators. Most of the articles dealing with this issue rely on figures that show how far the facilities are used. The analyzed articles used the following statistics to evaluate the sporting facilities: number of visitors, number of events, number of athletes coming there for training purposes, number of hours the venue is used for training, school lessons etc. These figures were taken from statistics, interviews and observations. In some studies, it remains unclear where these figures come from. It is not possible to collect exact data from interviews or observations. Azzali (2016) made observations on the Sochi Olympic Park, and concluded that the park is less frequented. In this case, it seems sufficient to be a reliable assessment,

since several observations were made at different times. However, in other cases, concrete figures and/or further information are needed to capture the whole picture.

One instrument that tries to overcome the weakness of absolute numbers is the Stadium Utilization Index (SUI). The SUI tries to reveal some of the challenges facing the usage of venues after the event. To calculate the SUI, the total annual/seasonal demand must be divided by the capacity of the stadium (Alm, Solberg, Storm & Jakobsen, 2014): $SUI = (\text{number of events} * \text{average attendance}) / \text{capacity}$.

This approach gives a more reliable assessment since it considers both the number of events and the attendance. To illustrate how the index works, an example is given. A stadium with a capacity of 50,000 seats hosts 20 matches annually. If all seats were sold out, the SUI would be 20. If the average attendance was only 5,000, the index would be just 2. In comparison to the average attendance, the SUI has a higher significance. If the stadium hosts three games per year and all of them are sold out, the average attendance would be 50,000, which is impressive. In this case, the SUI would however be only 3, indicating low usage (Alm, Solberg, Storm & Jakobsen, 2014).

One limitation of the SUI is that it is not able to evaluate the utilization of a stadium when it is used as a tourism attraction, like the Bird's Nest in Beijing. However, a sport venue can also serve other purposes and therefore the SUI does not completely capture a potential legacy.

The venues seen as iconic buildings to signal information, as exhibition pieces to illustrate and export excellence, or as catalysts to stimulate future additional impacts are not further considered, even though these are some of the most common explanations given for cost overruns. Finally, it is possible that they are used by a small number of persons, but for high-performance sport training.

Physical Activity Resource Assessment (PARA): the PARA is a brief one-page checkbox instrument used to assess all publicly available physical activity resources (e.g., parks, schools, sports facilities, fitness centers, community centers, and trails) in public neighborhoods. Each physical activity resource is rated on features, amenities and incivilities using discrete operational definitions (with pictures as aids) on rating scales of poor, mediocre or good. The PARA instrument has been used internationally and previous studies have shown that this checklist instrument has good inter-rater reliability (reliability score > 0.77) (Lee, Booth, Reese-Smith, Regan & Howard, 2005).

De Sousa-Mast et al. (2016) calculated a quality indicator (QI) in order to determine the quality of public physical activity resources by summing the scores assigned to the features and amenities categories and subtracting the score generated by the incivilities category.

International studies have consistently indicated that low socio-economic status communities tend to have less availability of physical activity resources and/or physical activity resources of lower quality than those found in higher income neighborhoods. The delivery of opportunities for physical activity practises well before and after the Olympic Games, particularly for low socio-economic status communities was, for instance, a stated commitment of the Rio 2016 Organizing Committee, as part of their Olympic legacies program. Thus, the PARA can be used to evaluate such legacy promises.

ENVIRONMENT ENHANCEMENT

Ecological Footprint analysis

The Ecological Footprint is widely recognized as an excellent measure of environmental sustainability and is used by governments and institutions worldwide. The Ecological Footprint is an aggregated indicator of the global ecological impact of resource consumption. It seeks to account for the consumption of the Earth's available resources. The idea of the concept is to compare the area required to support a certain lifestyle with the area available, thus offering an instrument to assess whether consumption is ecologically sustainable (Collins, Jones & Munday, 2009).

Ecological footprints can be calculated at any scale: for an activity, a person, a community, a city, a region, a nation or humanity as a whole. Cities, due to population concentration, have large ecological footprints and have become ground zero for footprint reduction (ibid).

The method is more appropriate for measuring impacts rather than legacies in terms of events. The Ecological Footprint analysis requires information on event-related consumption in physical terms. However, it is possible to estimate the carbon savings associated with some activities, for instance the use of renewable energy at an Olympic Village (ibid).

The method is not easy to apply and it is accepted that elements of the Ecological Footprint method are less than transparent to the non-specialist. For a more detailed explanation of the method and its limitations see Collins, Jones & Munday (2009).

For the London 2012 Games, greenhouse gas emissions were measured as a footprint for the period 2005 to 2012 as one indicator from the OGI study (ESRC, 2015, p. 36). However, the period does not include long-term legacy benefits or challenges.

POLICY AND GOVERNANCE

To measure the legacy of a policy intervention or new governance mechanisms, it is necessary to follow the evaluation principles mentioned above (chapter 5.3). For a policy intervention, additionality must be measured by considering deadweight, leakage, displacement, substitution and multiplier effects.

For this review, no study was found which measured the legacy of a policy intervention. There are only studies which mention that a new policy was established, while its outcomes remain uncertain.

SKILLS, KNOWLEDGE AND NETWORKS

Training/skills

For the review, one study measured a genuine skills legacy from the London 2012 Games (File et al., 2015). For their study they used a survey instrument to evaluate the personal and professional impact that working for the Games had in the year following the Games. The questionnaire explored the influence of the Games in terms of employment and professional development. Although the sample of the post-Games survey was very small (n=22), it gives important insights into how pre-Games education and training could be used effectively in the aftermath, and what benefits occurred for this group.

Another approach is suggested by DCLG (2015). According to the institution, the value of skills development should be assessed through the associated uplift in wage levels and then converted into an estimate of the impact on the Net Value Added (NVA).

“The wage uplift associated with an improvement in skills of people already in employment can be measured at an individual level, by gathering information on wages before and after the project. Alternatively, benchmarks have been produced by the Institute of Fiscal Studies, which can be applied to a base median wage. The gross NVA impact can then be assessed by multiplying the annual wage impact by a sector specific NVA to wage ratio. Adjustments will need to be made for each additionality factor and the assumed persistence of the benefits” (DCLG, 2015, p. 46).

Knowledge

Every host city gains considerable knowledge and expertise by staging the Olympic Games. However, the legacy is not the same for each city. A valuable legacy only

occurs when the knowledge and expertise are used. To evaluate and measure such a legacy, it is proposed to refer to an indicator from the OGI post-Games report from London 2012. For this indicator, the number of events/athletes/organizers/spectators are tracked for a long time period. The indicator shows how far the city is able to use the knowledge gained from hosting the Games. The period should start from the bid phase and last until several years after the Games.

INTELLECTUAL PROPERTY

The analysis could not reveal any method that measured a legacy of intellectual property. Although the facet of intellectual property was addressed several times, the studies tended to describe intellectual properties but did not measure their effect.

Intellectual property can be produced in many different industries and areas, so it is difficult to develop general recommendations for measuring a legacy of intellectual property. Methods must be applied depending on what should be measured.

BELIEFS AND BEHAVIOR

Many studies analyzed for this review measured legacies in terms of beliefs and behavior. To do so, most of the studies used a quantitative approach such as surveys. However, several problems became obvious when looking at these studies. Many surveys were conducted shortly after the Games. Thus, it is not possible to measure legacy but only impacts. Other studies surveyed people at a single point in time, mostly after the Games. Yet, to measure legacy it is vital to have at least two points of data collection to track the changes between them. All studies need a baseline assessment and must be longitudinal. Furthermore, the questionnaire must be designed for the purpose of the study, and the study has to comply with quality criteria such as reliability, validity and objectivity. The questionnaire must also be able to assess causality. If all these criteria are fulfilled, a survey is an appropriate instrument to assess legacies of beliefs and behavior.

Volunteering

To measure the volunteering legacy, Fairley, Gardiner and Filo (2016) suggest monitoring the repeat volunteerism incidence and behaviors of the volunteers involved in the Olympic Games. The OGI post-Games report from London 2012 took survey data, which asked for “volunteering to support sport for at least one hour a week” and “given

unpaid help at least once per month over the last 12 months". A long-term study which also considers the motivation for volunteering would be needed to assess whether there is a causal relationship between volunteering and the Games.

However, a volunteering legacy can be multifaceted, and should include not only the behavioral changes, but also the benefits that volunteers derive from the volunteering experience. This could include, for instance, improved skills and work experience, as well as social and wider community benefits. Measuring improved skills and work experience is addressed in the facet of skills, knowledge and networks. To measure social and wider community benefits, volunteers must be asked directly.

In order to place a value on the benefits of volunteering, a range of studies have applied a notional value to the hours of work undertaken. One study, for instance, values volunteer hours on the basis of the average weekly wage (Scottish Heritage, 2007). However, this figure does not value the legacy of volunteering. Nevertheless, this approach can be taken to value voluntary work in the aftermath of the Games. Thus, it is not about evaluating volunteer work during the Games but about evaluating volunteer work in the years following the Games.

6 Causality

6.1 Problem of causality

To evaluate the legacy of the Olympic Games, it is very important to be aware of the causal links between the Games and their legacies. Causality is present if there is a clear relation between two variables in which the "cause" (=Olympic Games) consistently explains the "effect" (=legacy), combined with an appropriate time-order sequence where the causal variable precedes the effect, and both are close together in time and space (Sarantakos, 1998). However, very few studies analyzed for this review took the problem of causality into account. For some legacies, causality is clear and they are fully attributable to the Games, especially in terms of sporting venues, or the Olympic Park. Yet there are many other legacies for which causality is less obvious. In many studies these causal links remain fragile and untested, especially in studies using a top-down approach. As already mentioned in chapter 5, a top-down approach is not able to fully isolate the Olympic effect from non-event-related city development or other

changes. Hence, it is not possible to measure, for instance, a legacy of enhanced physical activity by only looking at data showing how many people are regularly active, since there are too many other determinants influencing physical activity. The level of sport participation in a community is a dynamic phenomenon, subject to numerous influences, of which a city's hosting of the Olympic Games is but one (Veal, Toohey & Frawley, 2012). Consequently, a causal relationship between the Olympic Games and enhanced physical activity cannot be taken for granted, and changes in sport participation are not fully attributable to the Games and Games-related activities. Thus, causal analyses are an indispensable aspect of measuring and evaluating legacy.

The aim of this review is to:

- 1) Check how far causality between the Olympic Games and examined legacy is explained in the literature.
- 2) Review and analyze the methods and/or frameworks used to assess causality.

The first point was done in the narrative synthesis. Generally, the problem of causality played a minor role in the studies that were included in this review. Some studies addressed causality in a few sentences. These sentences were directly mentioned in the synthesis of this report. Some studies, for instance, point out that the plans for the city's development existed before the city's bid, and the Games mainly served as an accelerator (e.g. Barcelona 1992, Athens 2004, London 2012). If the causality of the studies is doubtful, it was also mentioned directly in the synthesis. However, this chapter aims to go further and offer theoretical and methodological solutions on how to study and prove causality between Olympic Games and their legacy (point 2).

6.2 Program theory and logic chains

Studies or evaluation frameworks that consider causality mostly appeared in connection with the London 2012 Games. Projects and programs that referred to the London 2012 Olympic Games were expected to be evaluated based on a theory of change structure – an explanation of why different interventions were developed and what they were designed to achieve (DCLG, 2015). This theory of change structure is derived from basic program theory. Program theory underpins the assessment of the efficacy and legitimacy of almost any social policy intervention (Weed, 2014). Program theory is a simple way of ensuring that outcomes are attributable to interventions, by asking two simple questions: 1) would programs have taken place without the Games and 2) could programs have taken place largely in the same format without the Games (ibid).

To illustrate program theories, logic chains are a useful tool. A logic chain usually includes:

- the baseline situation which sets out the policy context, including conditions that are outside the control of the decision-makers in the process but which have impacts on the delivery and performance of the outputs and outcomes, and also identifying the policy priorities which have been decided upon;
- the objectives of the project/program as set out during the preparation of the policy;
- Inputs: any resources or materials used by the program to provide its activities (e.g. staff, money, facilities, volunteers);
- Activities: any services or treatments provided by the program;
- Outputs: amount of activity provided, described in quantifiable terms (e.g., number of people served, amount of educational materials distributed, number of hours of service delivered);
- Outcomes: any characteristics of the participants that, according to the program theory, are expected to change as a result of the participants' have received services. The outcomes can be categorized into short-term outcomes, intermediate outcomes and long-term outcomes.

Logic chains are included in the evaluation framework for the London 2012 legacy. They can be drawn in different ways and assist in demonstrating how activities, and the inputs these entail, might deliver key outputs and outcomes, and therefore contribute to priorities and target impacts.

Furthermore, the logic chain must include an assessment of the analytical assumptions and relevant external factors that have an impact on the inputs, outputs and outcomes.

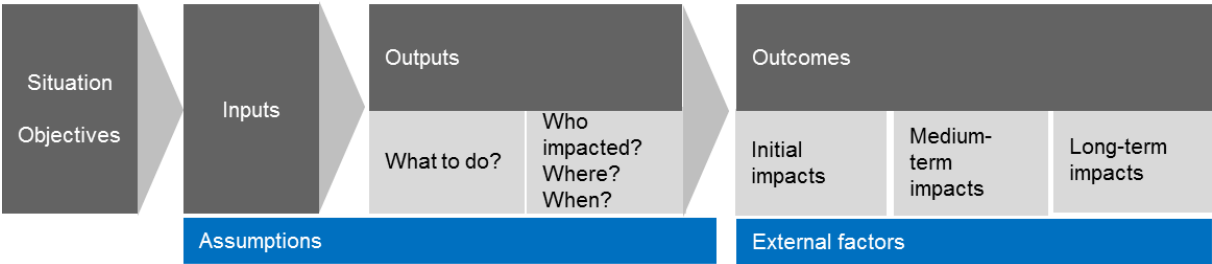


Figure 8: Structure of a logic chain (based on DCMS, 2009)

Logic chains are an important tool for planning and evaluating interventions and programs. There are illustrative logic chains provided by DCLG (2015) to show how the 2012 legacy evaluation framework would be applied. However, when analyzing these illustrative logic chains, some of the hypothetical links do not seem to be causal in reality. The logic chain for economy and skills, for instance, presumes impacts on children in poverty through the education programs. However, there are so many other factors influencing the child poverty rate, and education programs initiated by hosting the Olympic Games are only a small piece of the puzzle. The same also applies for the logic chain for sport and health. The chain presumes impacts on life expectancy at birth, cancer mortality and circulatory disease mortality. However, the causal link between sport participation and, for instance, cancer mortality is far more complex than presumed.

To conclude, logic chains are an appropriate and important instrument throughout the planning process. Event organizers and planners must be aware of the causal links between an intervention and possible outcomes and impacts. Yet, logic chains also have limitations, especially when it comes to evaluating and measuring Games legacies. For every impact that is influenced by several outcomes rather than just one, it is difficult to isolate the Olympic effect and thus to measure the real legacy of the Olympic Games. Consequently, logic chains give an overview of impacts that might occur, but these impacts should not be taken as KPIs to measure event legacy. For measuring purposes, it seems reasonable to look only at the outputs of the chain. For the sport and health logic chain, the outputs would be “new sporting facilities” and “access to facilities” (DCLG, 2015, p. 32). These outputs can be measured in a reliable and valid way.

7 Conclusion and research gaps

The purpose of this report was to systematically review and describe the body of literature related to the legacy of the Olympic Games. Overall, there has been a significant increase in articles examining Olympic legacy. Almost half of the articles are conceptual or commentary. Studies that are conceptual and try to develop an approach for measuring legacy proved not very helpful. Li and McCabe (2013), for instance, suggest using economic growth as an indicator to capture overall legacies. However, this

seems inappropriate because of the problems outlined above (see chapter 5). Much of the conceptual knowledge was gained from reports describing the evaluation framework for the London 2012 Olympic Games. However, the studies that attempt to measure the London legacies were not successful in applying this methodological knowledge.

Commentary articles are problematic since they describe legacies but do not measure them. They predominantly offer a general perspective on the structural changes, but do not reflect a variety of stakeholder perspectives. Consequently, a real assessment of the legacy remains unclear. Yet, for most of the Games editions, it was necessary to fall back on commentary articles, since they were the only source of information. It sometimes seems that academic publications do not provide current data. In the opinion of the author, it would sometimes be valuable to add media articles, to assess legacies, especially for the sporting venues. However, this would also bring new challenges, since these kinds of publications do not meet scientific criteria. Media articles are usually subjective and often tend to be negative because they must sell a story to the audience. Nevertheless, they may contribute with current data, and thus complement scientific research.

When considering the empirical articles, significant weaknesses became obvious. Most of the articles employed qualitative interviews, and few of them were data-driven. Within these interviews, legacies were described by respondents, which is important to capture legacies, but concrete data cannot be provided by this method. Quantitative studies were mostly conducted short after the Games, and thus they measured impacts rather than legacies, or legacies that had not been fully realized. Furthermore, studies do not use or rely on suitable indicators to operationalize structural changes. Another issue concerns the approach used for measuring legacies. Many studies try to measure legacy by using a top-down approach. By using a top-down approach, authors try to measure, in particular, tourism or economic legacies. As outlined above, a top-down approach is not appropriate for isolating the Olympic effect, and causality is not considered.

The review found that the most of the literature addresses legacies from the viewpoint of urban development, followed by the facet of beliefs and behavior. Other facets, especially those representing intangible legacies, are under-researched.

Taking all these things into account, the following research gaps can be identified:

- 1) Lack of longitudinal studies

There is a significant need for more research to examine legacies over longer time frames. Most of the studies analyzed in this review have a time frame of no more than five years after the Games took place. It would be necessary to have more research taking a look back to Olympic Games that occurred more than ten years ago. However, this would be even more challenging, since the further we move away from the event, the more difficult it becomes to attribute effects to the actual event. However, many Games legacies need several years to develop or to be transformed, which is why it is essential to conduct longitudinal studies over a period of at least ten years.

2) Lack of indicators

Indicators that can reflect and operationalize structural changes and their outcomes are missing. Although some indicators were proposed for the facet of urban development, these indicators have not yet been tested by any study. Other indicators were tested only once, or in another context (PARA, SUI), so it remains uncertain if they are appropriate for measuring legacies.

3) Lack of methods for measuring intangible legacies

Studies trying to measure intangible legacies in an objective, reliable and valid manner are lacking. Most of the studies trying to measure intangible legacies focus on changes of beliefs. However, most of them suffer from methodological issues or the time frame. Other studies focus on only one stakeholder group, which is often not representative. The facets of skills, knowledge and networks, policy and governance and intellectual property are under-researched.

4) The tables in annex 1 provide an overview of facets analyzed for each Games edition. Consequently, the tables offer more research gaps as they show which facets for which Games were not addressed at all. However, although for some facets studies do exist, this does not mean that profound knowledge exists.

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Annex 1: Analysis of facets for each Games edition

Olympic Summer Games

	2016	2012	2008	2004	2000	1996	1992	1988	1984	1980	1976	1972	1968	1964	1960	1956	1952	1948	1936	1932	1928	1924	1920	1912	1908	1904	1900	1896	
urban development	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x				x					
environment enhancement	x	x	x	x		x	x							x	x					x									
policy, governance	x	x	x	x	x		x				x														x				
skills, knowledge & networks		x	x	x	x		x				x		x																
intellectual property							x		x																				
beliefs and behavior	x	x	x	x			x	x	x				x	x															

Olympic Winter Games

	2014	2010	2006	2002	1998	1994	1992	1988	1984	1980	1976	1972	1968	1964	1960	1956	1952	1948	1944	1940	1936	1932	1928	1924	
urban development	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x								
environment enhancement	x	x			x																				
policy, governance	x	x	x	x																					
skills, knowledge & networks	x	x	x	x	x		x			x				x											
intellectual property													x												
beliefs and behavior	x	x	x	x	x		x	x	x				x	x											

Annex 2: Games editions and facets of legacy

Games edition*	Year	Facets of legacy					
		urban development	environment enhancement	policy, governance	skills, knowledge & networks	intellectual property	beliefs and behavior
Rio de Janeiro	2016	3	1	1	0	0	1
Sochi	2014	3	2	1	2	0	2
London	2012	14	6	1	7	2	13
Vancouver	2010	5	1	2	4	1	9
Beijing	2008	9	8	5	3	0	9
Torino	2006	6	0	1	4	0	5
Athens	2004	14	1	2	5	0	2
Salt Lake City	2002	3	0	0	1	1	3
Sydney	2000	9	4	3	3	1	3
Nagano	1998	3	0	1	2	1	2
Atlanta	1996	7	0	1	0	0	1
Lillehammer	1994	3	2	0	2	1	2
Barcelona	1992	11	1	0	4	2	2
Albertville	1992	5	1	0	1	1	3
Seoul	1988	6	1	3	3	2	3
Calgary	1988	4	0	0	3	2	3
Los Angeles	1984	5	0	0	2	2	4
Sarajevo	1984	3	0	0	1	1	1
Moscow	1980	2	0	0	1	0	1
Lake Placid	1980	3	0	0	1	0	1
Montreal	1976	3	0	1	0	0	0
Innsbruck	1976	1	0	0	1	1	1
Munich	1972	2	0	0	0	0	0
Sapporo	1972	1	0	0	0	0	0
Mexico City	1968	3	0	1	1	0	2
Grenoble	1968	1	0	0	1	1	0
Tokyo	1964	4	4	0	1	1	1
Innsbruck	1964	1	0	0	1	1	1
Rome	1960	1	0	0	0	0	0
Melbourne	1956	2	0	0	0	0	0
Helsinki	1952	1	0	0	0	0	0
Oslo	1952	2	0	0	0	0	1
Berlin	1936	1	0	0	0	0	0
Los Angeles	1932	1	1	0	0	0	1
Stockholm	1912	1	0	0	0	0	0
London	1908	1	0	1	0	0	0

Notes. *Fields that are highlighted in grey refer to Olympic Winter Games

Annex 3: Explanation of methods listed in table 1

Difference-in-difference

The idea behind the DD approach is to determine whether some statistic of interest (e.g. price level or employment rate) changed more for the host city during or after the event than for the other cities observed. The event legacy is the difference between the 'reference cases' and the 'event case'. For this method, data for cities with similar structure and size in the same macro economy for a certain period must be collected. The average development of the other cities builds the 'reference case'.

The shortcomings of this method are related to the difficulties in selecting 'reference cases' that do not have systematic differences. For event legacy measurement, there is another problem. Rarely are a group of host cities available that can be compared with a relatively homogeneous group of other cities. Often there is only one host city available (Preuss, 2007).

Gravity model of international trade

The gravity model of international trade makes predictions about bilateral flows based on the economic size and distance between two units. The model is normally used to assess trends in the world of global trade. The model can be augmented by adding a host of other factors that might also affect their trade intensity (Rose & Spiegel, 2011).

Synthetic control method

The synthetic control method aims to estimate treatment effects by constructing a weighted combination of control units, which represents what the treated group would have experienced in the absence of receiving the treatment. While Difference-in-Difference estimation assumes that the effects of unobserved confounders are constant over time, the synthetic control method allows for these effects to change over time, by re-weighting the control group so that it has similar pre-intervention characteristics to the treated group (Kreif, Grieve, Hangartner, Turner, Nikolova & Sutton, 2015)

Chow Test

The Chow Test is a statistical and econometric test of whether the coefficients in two linear regressions on different data sets are equal. In econometrics, the Chow test is most commonly used in time series analysis to test for the presence of a structural breakpoint. In program evaluation, the Chow test is often used to determine whether

the independent variables have different impacts on different subgroups of the population (Demir, Eliöz, Cebi & Yamak, 2015).

Percentage trend analysis

Trend analysis is the presentation of amounts as a percentage of a base year. Having the trend percentages makes it easier to read and compare the financial data from one year to another, calculated as:

Percent Change = (Current Year Amount – Base year Amount)/Base Year Amount.

(Demir, Eliöz, Cebi & Yamak, 2015)

Membership rate analysis

Quantitative method analyzing membership rates in sport clubs. However, membership data does not indicate the frequency of participation, only the number of people registered for a sport. Furthermore, it is difficult to attribute membership changes to the Olympic Games. Other measures seems to be more important (Pappous & Hayday, 2015)

Environmental Input-Output modelling

Environmental Input-Output modelling is an expansion of conventional Input-Output analysis introducing the environmental dimension to the conventional monetary analysis. The method uses physical units to describe activities between sectors, added as extra lines to the conventional Input-Output table. For each industry, the emissions and resource uses related to its activity are recorded.

Environmental Input-Output modelling is typically based on static accounting, which makes it less suitable for long-term sustainability analysis, and thus also unsuitable for measuring event legacies.

Annex 4: List of first legacies

- **London 2012:** first Games with a “learning legacy” initiative → this initiative provides an archive of reports, case studies and research papers to share the whole knowledge and communicate lessons learned.
- **Sydney 2000:** start of the Transfer of Know How program. For the first time explicit and tacit knowledge from over 90 relevant SOCOG managers was collected and sold to the IOC.
- **Lillehammer 1994:** first “green Games”.
- **Los Angeles 1984:** first Games which were privately financed → the sponsorship model has become an important legacy and provided the blueprint for the creation of the IOC’s worldwide TOP sponsorship program
- **Munich 1972:** first Olympic mascot.
- **Mexico City 1968:** first Olympic Identity Program that introduced strong decorative elements and signposts to the whole city, particularly the Olympic routes.
- **Innsbruck 1964:** for the first time the Olympic Flame was lit in Olympia and transported to the Winter Games.
- **Tokyo 1964:** the first Olympic education program was conducted (Olympic education basically disappeared after the Games → no legacy).
- **Oslo 1952:** first Ski Museum which was the precursor of Olympic Museums.
- **Berlin 1936:** first torch relay.
- **Los Angeles 1932:** first Games that produced a profit which flowed back into the community, creating various legacies.
- **Los Angeles 1932:** first Olympic Village built for the Games.
- **London 1908:** first purpose-built modern Olympic Stadium.