

Olympic Structures and their Effect on the Host City's Environment, Economy, and Infrastructure

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Abstract: The impact of the Olympics has long been under question as cities have been left in an inescapable detriment to their economy and environment while others experienced an overall profit. Therefore, it is important to analyze how some cities were so successful in hosting the Olympics while others were left with a giant bill that still holds an impact on them today. To maximize the true effects the Olympics can hold onto a city's production of infrastructure while minimizing the debt they are left with, it is important to reflect on cities that have hosted the Olympics in the past. The objective of this paper is to analyze factors such as infrastructure, environment, economy, etc. to conclude the true overall impact an Olympic Series could cause on a host city. The findings of this paper are intended to help perceive the true effective procedures to profit the most from hosting the Olympic Games, while also being a catalyst to what could be altered in the process to make the process as cost-efficient and effective as possible.

Keywords: Olympics; Olympic Games; environment; host city; economy; infrastructure.

1. INTRODUCTION

The Olympics serve as a catalyst for infrastructure within a host city, as planned roads, bridges, railroads, airports, etc. are prioritized to accommodate for the mass fluctuation of spectators. However, the impulsive commitment to flaunt development has left detrimental ramifications to the host city's economy and environment as the exorbitant pricing and magnitude of such projects disturbed ecosystems while exhibiting extensive portions of carbon. To prevent such affliction to countries and the environment, it is important to review past Olympic games.

Research Methodology: The methodology that has been used for this paper was through analysis of several official documents from each Olympic series along with other sites found on Google. Infrastructure and other amenities were pulled from unbiased official Olympic record documents, while environmental and economic impacts were pulled from various opinionated websites over the web.

2. 1984 LOS ANGELES, USA

2.1 Bidding of the 1984 Olympics

The 1984 Olympic bidding consisted of little to no bids, as the Olympic reputation had been put into jeopardy due to recent incidents.¹ The 1972 Munich Games showcased the fatal assault of Israeli competitors while the 1976 Summer Montreal Games left the city in a \$1.5 billion debt that eventually took 3 decades to pay off.¹ In 1979, Los Angeles, USA was unanimously selected as the host of the 1984 Summer Olympics due to bidding deficiencies from other countries.²

2.2 Infrastructure

General Infrastructure: Los Angeles dedicated much of its budget to refurbishing new roads, bridges, freeway ramps, etc.²³ Developments of off-street facilities at Rose Bowl and Coliseum Peristyle along with many rehabilitations of road

networks transpired: work on 39th Street, Vermont Avenue, Figueroa Street, Vermont Avenue, Vernon Avenue, Martin Luther King Boulevard, Broadway, and Westwood Boulevard.²⁴ The refurbishment of such roads helped control the high volume of transportation services: shuttle cars, buses, taxis, etc.²³ These general improvements to land infrastructure have had a great impact on the Olympics and the years after; various networks of roads in Los Angeles viewed serious improvements to accommodate for the mass travel, which has left a long impact on Los Angeles citizens years after.²³

Olympic Infrastructure: Los Angeles built various Olympics buildings, training facilities, and stadiums to accommodate the vast range of sports the Summer Olympics holds.²³ The first ever Cycling Velodrome was constructed on July 9th, 1981 in California State Dominguez Hills due to their sponsorship agreement for the Olympics.²⁴ A hockey stadium was announced to be made at East Los Angeles College on April 14th, 1982.²⁴ The Weingart Foundation pledged \$3.2 million to help remodel the Olympic stadium, including the addition of a SuperTurf field and an all-weather synthetic track made of Regupool.²⁴ This stadium was later named Weingart Stadium to acknowledge the significance the Weingart Foundation provided.²⁴ A Swimming Stadium was also built at the University of Southern California as a permanent facility.²⁴ USC also housed the Olympic Village, using existing college facilities such as USC's dining hall.²⁴ These facilities along with others such as the Los Angeles Memorial Coliseum and the Rose Bowl helped to form the Olympic facilities in use during the Games.²⁴

2.3 Results

The Los Angeles Olympics resulted in a \$215 million surplus due to a recent boom in T.V. broadcasts.¹ Through the success of the 1984 L.A. Olympic Games, the reputation of the Olympics was restored.¹ Bid amounts drastically changed as countries were eager to gain the benefits of the Olympics, but also to showcase wealth and modernization to tourists. The bidding went from 2 cities for the 1988 Olympics to 12 for the 2004 Olympics.² This allowed the IOC to encourage ambitious plans and wasteful spending of money as countries battled to win over the IOC with costly plans.

3. 1988 SEOUL, SOUTH KOREA

3.1 Bidding of the 1988 Olympics

The 1988 Summer Olympics consisted of 2 bids from Japan and Korea due to Melbourne, Australia, and Athens, Greece retracting their Olympic application.² Korea was confident in its ability to host the games, as its per capita, GNP was USD 1,242 compared to Japan's USD 800 during the 1964 Olympics and Mexico's 631 USD per capita GNP during the 1968 Olympics.²⁶ However, on October 26, 1979, President Park Chung Hee was assassinated, causing Park Chongkyu to resign as the head of KOC (Korean Sports & Olympic Committee).²⁶ Seoul opposed the plan to host the Olympics due to the short deadline to build all facilities.²⁶ However, Seoul, Korea was chosen to host the 1988 Summer Olympics, beating Japan in a bid 52:27.²

3.2 Infrastructure

General Infrastructure: Seoul focused on refurbishing streets, railroads, subways, walkways, and parks.²⁶ New blocks were laid upon Seoul's subways lines 2-4 and new car lanes were paved.²⁶ Pedestrian walkways experienced critical improvements as pedestrian walks ways in central Seoul were replaced with durable, small-sized high-pressure blocks; pavement rates saw an 8.7% increase going from 83% in 1982 to 91.4% in 1988.²⁶ Major traffic locations experienced an expansion of their roads while unpaved and worn-out roads were repaired; road pavement rates went from 75.6% in 1982 to 86.5% in 1988.²⁶ Along these roads, street lamps were refurbished or built, experiencing a 53.1% increase between 1981 to 1988.²⁶ To redevelop railroads, schedules were set up: 1983-1984 were used to remove dirt, trash, and unauthorized stacks of materials, 1985-1987 to refurbish unsightly areas, and 1988 to refurbish the rail stations.²⁶ 1,000 kilometers of roads were built annually from 1980-1987, increasing the total to 54,689 km existing in Korea.²⁶

Olympic Infrastructure: Seoul's main Olympic infrastructure consisted of the Olympic Stadium, Olympic Village, and Press Village.²⁶ However, most of Seoul's focus was on building and refurbishing Olympic parks. These parks consisted of Olympic Park, Asia Park, Seoul Grand Park Playground, Seokchon Lake Park, Pari Park, Kyonggi Palace Park, Chongdong Park, and Green Park.²⁶ Refurbishments consisted of 5 different parks: Namsan Park, Sajik Park, Pagoda Park, Children's Grand Park, and Seoul Grand Park.²⁶ These parks paid great compliments to the national stadiums and went towards counteracting carbon emissions. With trees and other vegetation in the parks, there was a large offset in the carbon produced which ultimately helped not only climate change but the visual appeal of South Korea.

3.3 Results

The Seoul Olympics were a huge success resulting in a \$479 million surplus, the highest-ever profit record from an Olympic Series.³⁰ Through a showcase of new developments and progressions, Korea recovered from the assassination of President Park Chung-Hee and was recognized as a leading country.²⁶ The economy reached a Per capita GNP of 3,728 USD in 1988 compared to its Per capita GNP of 125 USD in 1962; the economy was projected to grow at a constant rate of 8.5% after that.²⁶ Export value experienced tremendous growth, reportedly growing approximately annually by 36.7%.²⁶ Values reached 60.67 billion USD, making it the 11th largest exporting country. Imports grew from 422 million USD in 1962 to 41 billion USD in 1988; imports experienced a 26.3% increase in 1987 alone.²⁶ Tourism also experienced vast growth, attracting over 2,300,000 tourists.²⁶ This boosted Korea to the 10th largest tourist destination in 1988.²⁶

However, the Seoul Games were a disaster for most residents.¹⁰ 5 years before the games, 48,000 homes were destroyed to pave paths for new infrastructures, ultimately displacing an estimated 720,000 people.¹⁰ Those who refused ultimately were threatened with sexual and physical violence as local gangsters were hired to intimidate resisters.¹⁰ Also, Seoul, to this day, faces many expenses from hosting the Olympics as \$8.5 million annually is put into maintaining unused Olympic facilities.¹ Olympic facilities not only cost South Korea large sums of money annually, but it also exacerbates the limited leeway for new construction projects.¹

4. 1992 BARCELONA, SPAIN

4.1 Bidding of the 1992 Olympics

The 1992 Olympics consisted of 6 countries in the final bid: Spain, France, Australia, Yugoslavia, the United Kingdom, and the Netherlands². The bidding was taken to 3 rounds in which Spain won by a landslide with 47 votes compared to France's 23 votes, Australia's 10 votes, and Yugoslavia's 5 votes². The United Kingdom and the Netherlands were dropped in the second round². Barcelona was ultimately chosen as the location to host the 1992 Summer Olympics².

4.2 Infrastructure

General Infrastructure: The large influx of tourists catalyzed large construction projects. Airport terminals were enlarged by 9,400 square meters, allowing Barcelona to add a third runway to increase air traffic.²⁵ With this, 5,000 new parking spaces were proposed to accommodate the substantial increase in visitors.²⁵ Ports were also extended, which helped accommodate transportation between Montjuic and Parc De Mar, central points of the Olympic Games.²⁵ New railroad plans were introduced: dismantling the railway line from Estació de França to the Plaça de Les Glòries and relocating the coastal line from Estació de França to Badalona underground.²⁵ The Barcelona Subway Plan was altered, now having the line stretch to connect neighboring towns of the games.²⁵ Pending projects such as work on the Rovira and Vallvidrera tunnels were completed and Plaça de Les Glòries was refurbished to accommodate 3,000 extra parking spaces.²⁵ This ultimately led to a smooth flow of transportation within the Olympic Games, as well as for citizens of Barcelona long after.

Olympic Infrastructure: Barcelona favored using existing facilities to host the Olympic Games; out of the 46 possible facilities considered suitable for the Games, only 13 were newly built.²⁵ Unique amenities such as the Olympic stadium, sports hall, Olympic pool, and velodrome were newly constructed, while events of other sports such as archery, weightlifting, and wrestling were held within renovated existing buildings.²⁵ Ultimately, the construction of new sports facilities and refurbishments of old ones led to increased sports by the public.

4.3 Results

The 1992 Barcelona Olympics ultimately led to a surge in tourism, having Barcelona go from the 11th most popular to the 6th most popular tourist destination in Europe¹. The Olympics catalyzed modernization, having had beaches cleaned, new parks built, and an efficient public transportation method arranged. Due to sponsors, Barcelona saw a surplus of 358 million pesetas (1992), which helped Barcelona rapidly develop.¹⁹

5. 1996 ATLANTA, USA

5.1 Bidding of the 1996 Olympics

The 1996 Summer Olympics consisted of 6 total countries: the USA, Greece, Canada, Australia, the UK, and Yugoslavia.¹ The bid was taken to 5 rounds with the US and Greece being the bid leaders.¹ Atlanta presented strengths such as a world-class airport, existing sports venues, new construction plans, effective transportation, and more which ultimately landed them the position to hold the 1996 Summer Olympic Games.²⁵

5.2 Infrastructure

General Infrastructure: Existing key roads, intersections, and bridges were improved while new ones were developed.²⁵ HOV lanes were created on interstate highways approaching the city to encourage carpooling.²⁵ Finally, Pedestrian corridors were created to encourage foot traffic, and freeways were landscaped accordingly.²⁵

Olympic Infrastructure: Atlanta made use of many existing facilities to accommodate the Olympics, only building facilities that were necessary to host the Games. Such facilities included an Olympic Stadium, Stone Mountain Park Tennis, Archery, and Cycling center, Georgia Tech Aquatic Center, Georgia International Horse Park, Clark Atlanta University and Morris Brown Stadium, Morehouse College Gymnasium, construction of Lake Lanier, and Wassaw Sound.²⁵ The Olympic Village was constructed on a 30-acre site, which was made to accommodate seating for 85,000 spectators.²⁵ Later, this stadium was converted into a ballpark for the Atlanta Braves.²⁵ Stone Mountain Park remains a tennis facility with the archery and cycling centers being removed from the facility.²⁵ This facility contained 12,000 seats during the duration of the Games of which 8,000 remains to host events and organizations such as the Atlanta Lawn Tennis Organization, the largest amateur tennis organization in the world.²⁵ The other facilities also either remained or were renovated to accommodate different interests: the aqua center turned into an intercollegiate aqua facility, the horse park remained with new amenities such as a golf course and hotel, etc.²⁵

5.3 Results

The 1996 Olympics harbored the bombing of Centennial Olympic Park in which 2 were killed and 112 were injured. This tarnished the Olympic name and made people question the idea of peace within the Olympics.²⁵ However, ultimately, the 1996 Summer Olympics resulted in a \$19 million payoff for Atlanta and much of the built infrastructure is still in use today.²⁵ The Olympics left a lasting impact on the state, encouraging athletics and traffic flow.²⁵

6. 2000 SYDNEY, AUSTRALIA

6.1 Bidding of the 200 Olympics

The 2000 Olympics consisted of bids from Australia, China, the UK, Germany, Turkey, Brazil, Italy, and Uzbekistan which Brazil, Italy, and Uzbekistan ultimately withdrew.² Due to Sydney, Australia's history of hosting national events such as the World Amateur Boxing Championships in 1991 and the International Football Federation World Youth Cup in 1993, they had the credentials to host the Games.²⁸ After an inspection of Sydney in March of 1993, Sydney was reported to have the environment, culture, people, and facilities substantial enough to hold the Olympic Games.²⁸

6.2 Infrastructure

General Infrastructure: ORTA was founded in April 1997 to establish transportation methods that would accommodate the large influx of tourists in Sydney.²⁸ Due to the long lead time with road improvements and infrastructure development, planning needed to occur instantaneously.²⁸ Homebush Bay, the site of the Sydney Olympics of 2000, needed to be cleaned due to its immense pollution.²⁸ Along with cleaning up Homebush Bay, new roads and rail links were created and telecommunication and electricity services were installed.²⁸ These developments were encompassed in the Bunning Report which led to a group of private developers overseeing the progression of Homebush Bay.²⁸ The State Sports Centre was opened and Bicentennial Park was created following the years of a major rehabilitation of the city.²⁸

Olympic Infrastructure: Sydney invested much of their infrastructure into building sports venues for individual sports along with the Olympic Stadium, Olympic Village, Penrith Whitewater Stadium, and others.²⁸ Sports infrastructures including Blacktown Olympic Centre, Baseball Stadium, Beach Volleyball Centre, Dunc Gray Velodrome, Mountain Bike Course, New South Wales Tennis Centre, Ryde Aquatic Leisure Centre, and many others.²⁸ Plans were made to transform each of these Olympic facilities into public commodities but ultimately remained unsuccessful due to high prices.²⁸

6.3 Result

The total cost came out to about \$6.5 billion, which was largely funded by private sectors and NSW State Government, funding around \$1.3 billion and \$2.3 billion respectively.¹¹ Sydney was left with little financial burden as much of the costs were made up through record-breaking ticket sales of about 91%.¹¹ Trade also faced great improvements as a \$1.3 billion deficit in August became \$450 million in export revenue.¹¹

Sports saw a great increase in participation after the Olympics.¹¹ Beach volleyball experienced a 7% increase in participation while water polo, hockey, and athletics saw an increase in participation of 3%.¹¹

Sydney saw a slight increase in tourism after the Olympics.¹ During the Olympics however, Sydney saw a huge increase with an extra 1.6 million tourists coming in from 1997-2004.¹¹ As a result of the Olympics, an estimated 150,000 new jobs were created for the people of Sydney.¹¹

However, Sydney faced some repercussions from hosting the Games. Much of the Olympic infrastructure that was built had little to no use due to its immense size, but cost too much to tear down.¹ As a result, Sydney spends an annual \$30 million annually on Sydney's stadium alone.¹

7. 2004 ATHENS, GREECE

7.1 Bidding for the 2004 Olympics

The 2004 Olympics consisted of 11 bids: Greece, Italy, South Africa, Sweden, Argentina, Turkey, France, Brazil, Russia, Puerto Rico, and Spain.² The bidding file for Greece was submitted in 1990 in which the Athens Olympic Committee proposed considerable contributions to reclaim the city's sea-front, create major roads throughout the city, transfer the airport from the site at Helliniko, expand and create new transportation, resolve long stood problems in infrastructure networks, and others.²⁹ This was enough to win over the IOC as Athens, Greece was declared the host city for the 2004 Olympics.²

7.2 Infrastructure

General Infrastructure: To accommodate the new influx of Olympic infrastructures, roads were built to prevent any lone-standing venues.²⁹ One such road was the Olympic Ring Road.²⁹ This road connected the two main competition areas, OAKA and Faliron.²⁹ However, most of the general infrastructure was constructed after the war in the 1950s.²⁹ Many of the roads faced much-needed renovation to mitigate traffic congestion as Athens had never had to accommodate millions of tourists.²⁹ The last renovations and construction for general infrastructure consisted of road repairs, church renovations, and improvements on Piraeus harbour.²⁹

Olympic Infrastructure: Athens was very uncoordinated in their infrastructure building as construction and renovation were very delayed.²⁹ In one such instance, the renovation of Panathinaiko was delayed until there wasn't enough time to meet the deadline which ultimately resulted in changing the venue to Loudovikos Square, a less time-consuming project.²⁹ This wasn't a one-time redirection either.²⁹ Other construction projects were also redirected due to the internal economic recession that Greece faced.²⁹ In the end, construction was largely overpriced due to the short time frame that workers had which resulted in lower-level construction projects for the same if not higher prices than that of what was originally planned.²⁹

7.3 Result

The Athens Olympics showed devastation for Greece as it faced billions of dollars in debt which ultimately bankrupted the country. This was partly due to the large security costs -over \$1.5 billion in security alone- due to the recent events of 9/11.¹

Infrastructure for the Olympics remains largely unused as the lack of resources to maintain certain venues, stadiums, facilities, etc. caused the abandonment of most.¹ Although improvements to general infrastructure were also made, construction workers remain largely unpaid for their construction of these roads.²⁹ This is largely due to an acceleration of price as a lack of planning from Greece's Olympic Committee led to a necessary speedy construction.

8. 2008 BEIJING, CHINA

8.1 Bidding for the 2008 Olympics

The 2008 Olympics consisted of 10 bids: China, Canada, France, Turkey, Japan, Thailand, Egypt, Cuba, Malaysia, and Spain.² After China's crushing defeat to Australia for the 2000 Olympics, they rebid for the 2008 Olympics proposing attractive qualities to the IOC.³¹ Such qualities consisted of a steady economy (nearly \$1 trillion GDP in 1999), low crime rates, and strong security systems supervising major events.³¹ Although China was faced with some challenges- famous capital cities for competition, differences in culture and ideology, etc³¹- they eventually won the bid in the 2nd round with an overwhelming 56/105 votes.²

8.2 Infrastructure

General Infrastructure: Due to several wreck points in general infrastructure, Beijing spent more than ½ of its \$45 billion budget on improving general infrastructure-airports, roads, highways, rails, etc.-¹ in hopes of reducing traffic congestion

and low city management.³¹ From 2001-2007 roads in Beijing increased from 2,500 kilometers to 4,500 kilometers.³² Rail transit lines also faced incredible improvements as two lines become 8 from 2002-2008.³² Finally, roads, bridges, and overpasses faced serious renovations as nearly 510,000 square meters of tactile surfaces were either installed or replaced to help modernize.³² Main construction projects consisted of the construction of Fourth Ring Road (100km), Highway Belt One (93 km), Suburban Light Railways (40.5km), Light Railway Feeder Line to Summer Palace (8km), Light Railway to Capital Airport (16km), and more.³²

Olympic Infrastructure: Beijing had many of the Olympic infrastructures already required for the Olympics as billions of US dollars annually were invested into Beijing facilities.³¹ By the 2008 bid, Beijing already had more than 5,000 well-equipped sports facilities including 6 gymnasiums that could seat 4,000 people along with 6 stadiums that could seat over 10,000 people.³¹ Beijing promised renovations along with new constructions as needed.³¹ Beijing took on 8 main construction projects to accommodate the Olympics: The Olympics Sports Centre, Wali Village, National Stadium (Bird's Nest), National Indoor Stadium, National Aquatics Centre, International Broadcast Centre, Main Press Centre, and the Olympic Village.³¹ In total, 37 venues were selected with 10 needing no construction, 5 in need of renovation, and 22 having to be built.³¹ In addition, 59 training facilities were renovated to further accommodate the Olympics.³¹ With the intent of reuse after the Games, plans were set out for transformation such as the National Aquatics Centre being transformed into a waterpark and the National Indoor Stadium renovated to become a multi-functional fitness and recreational center.³¹

8.3 Result

Although the green initiative for the 2008 Olympics was strong, it eventually fell off as the years went by. Beijing's "Bird's Nest" remained mostly unused until 2022 even though annual payments of roughly \$10 million were paid to maintain it alone.¹ The motive to reduce air pollution through the Green Games was also flawed as it caused a halt in many projects and jobs. China's prohibition of digging and pouring concrete from July 20th, 2008 led to the banning of construction projects that wouldn't be completed by July 20th, 2008.⁶ Also, heavily polluting companies were forced to cut emissions by 30% during the games which drove commodity prices through the roof as production wasn't as efficient.⁶ Numerous companies had to shut down for months including the Eastern Chemical Plant of Beijing Eastern Petrochemical Co. and coal-burning companies.⁶ The increased prices drove tourists away as Beijing faced an overall decrease in tourism due to overcrowding, air pollution, and high prices.¹ China faced huge losses economically as a total of \$3.6 billion was raised as revenue, a large difference from the nearly \$50 billion cost.¹ Revenue was very limited as more than 1/2 of T.V. revenue went to the IOC.¹

The dislocation of residents was a large problem for the Beijing Games. China was faced with numerous protests to prevent such dislocation which ultimately resulted unsuccessfully.¹⁰ Nearly 1.5 million Chinese citizens were displaced along with a large sum of undocumented residents.¹⁰ The undocumented residents were not compensated which led to a sharp rise in homelessness at the time.¹⁰

The Games also had a positive impact on Beijing as new construction projects led to millions of job opportunities along with a decreased cost of transportation.²¹ The long-standing problem of traffic congestion was mostly mitigated due to the thousands of kilometers of transportation methods built including railways, roads, and bridges.²¹ Airport renovations also allowed for easier traveling in and out of China.²¹

9. 2012 LONDON, UK

9.1 Bidding for the 2012 Games

The 2012 Olympics consisted of 9 contestants, with only 5 putting in an actual bid: the UK, France, Spain, the USA, and Russia.² Since 1997, it has been in the best interest of the British Olympic Association to host the Games in the U.K. However, after defeats in 1992 and 1996, the British felt it hard to win IOC votes as the IOC considered London the only possible host location.²⁰ After skipping 2000-2008 Olympic biddings, a bid for the 2012 Olympics was finally presented and was taken to 4 rounds. London ultimately comes out victorious winning 54:50 to Paris.²

9.2 Infrastructure

General Infrastructure: On July 7th, 2005, London faced a terrorist attack on its transport system which took the lives of 56 and injured over 770 people.²⁰ Due to this attack, much of London's infrastructure and transport were dismantled. This led to the uptake of the Wembley Project-a project which built new roads and general infrastructure- to quickly construct transportation routes for the Olympics.²⁰ The project ultimately cost \$1.24 billion which was more than twice London's

budget leading to unexpectedly high spending.²⁰ This project accounted for most of the general infrastructure used during the 2012 Olympics along with smaller projects such as the Primary Substations and utility networks.²⁰ Two underground tunnels spanning 6km each were built to hold nearly 200km of power cables which cost the ODA nearly 8.1 billion euros.²⁰

Olympic Infrastructure: The Olympic Delivery Authority was founded through the London Olympic Games and Paralympic Games Act in which they were responsible for all infrastructure related to the Olympic Games.²⁰ The main projects taken on by this body were the Olympic Stadium and Lee Valley White Water Centre which played large roles in sports events.²⁰ The Olympic Stadium with a capacity of 80,000 people and the Aqua Centre consisting of 3 pools truly embodied the peak of London's Olympic Venues.²⁰ Other Olympic venues included Bands Hatch, City of Coventry Stadium, Eton Dorney, Hadleigh Farm, Hampden Park, Hampton Court Palace, Lee Valley White Water Centre, Millennium Stadium, Old Trafford, St. James' Park, and Weymouth and Portland which accommodate for Paralympic road cycling, football, rowing, cycling, football, road cycling, canoe slalom, football, football, football, and sailing respectively.²⁰

9.3 Results

The London Olympics presented another flop to the Olympic legacy as the \$18 billion in cost resulted in a minute revenue of just \$5.2 billion, ultimately facing a deficit of \$12.8 billion.¹ Tourism also largely decreased as overcrowding, higher prices, and security during the Games disincentivized a future visit.¹ During the Games, shops, restaurants, tourist attractions, etc. which were not located near the stadiums faced large droughts of customers leading to lower income for local shops.⁵ This in fact hurt the economy of London as money spent on hotels, food, etc. that are owned by people outside the U.K. made a profit.⁵ Money that would once be in circulation in the U.K. was then now transferred to the owners of the commodities who often are outside the U.K.⁵

Employment rates also faced minimal improvement as only 10% of the 48,000 jobs created went to unemployed people.¹ Most jobs were given to more skilled and efficient workers due to the terrorist attack in 2007. Infrastructure needed to be constructed quickly leaving no room for unskilled unemployed workers on projects involving the Olympics.²⁰

10. 2016 RIO, BRAZIL

10.1 Bidding for the 2016 Games

The 2016 Olympics consisted of 7 contestants of which only 4 submitted a bid: Brazil, Spain, Japan, and the USA.² The bid was taken to 3 rounds in which Brazil beat Spain by a staggering ratio of 66:32.² Japan faced serious fallouts after spending an estimated \$150 million on a failed bid.¹ Brazil, however, faced serious political and financial problems that put the country in a state of confusion and crisis.¹⁸

10.2 Infrastructure

General Infrastructure: Rio was severely deficient in general infrastructure which led to severe spending on hotel rooms and road improvements. The minimum hotel room requirement for the Olympics stood at 40,000 vacant rooms which led to Rio being forced to construct 15,000 new rooms, nearly 1/2 of the minimum requirement.¹ Transportation was also lacking which led to several billion dollars to improve roads, train lines, and airports which further added to the already costly bill.¹ Rio's subway station was extended by a kilometer to increase its capacity by 300,000 people daily.¹⁸ This extension along with renovations of the train system and four new bus-rapid-transit lines came to make up the "high-performance transport ring".¹⁸

Olympic Infrastructure: Rio spent an estimated \$6.7 billion on venues for the Olympics, which mostly consisted of the Olympic Village and the main Olympic Park.¹⁶ The Olympic Park was built over 44 acres which consisted of venues such as Areaba Carioca 1, the Rio Olympic Arena, Maria Esther Bueno Stadium, Maria Lenk Water Park, and the Velodrome with a capacity of 16,000, 12,000, 10,000, 5,000, and 5,000 respectively.¹⁶ In total, there were 14 different venues built for the event with venues such as the Olympic Tennis Central. The Olympic Village was built on 185 acres which consisted of 3-4 bedroom apartments, in total consisting of 17,700 beds.¹⁶

10.3 Results

The Rio Olympics were one of the most detrimental Olympics in history. Facing an unaffordable bill of \$20 billion, Rio was left to handle at least \$13 billion.¹ Rio was announced bankrupt and in a state of financial crisis where public employees were unable to be paid due to the immense spending on infrastructure used to power up old neighborhoods and construct new venues.¹ Rio took a \$900 million bailout from the federal government to be able to afford the necessities for its citizens

which left Olympic venues unable to be attended to.¹ Today, most of these Olympic venues stand abandoned, taking up substation portions of land.

Rio's plan to refurbish new neighborhoods also backfired as not only did it add up more debt, but it also left thousands dislocated from their homes.⁹ An estimated 60,000-70,000 people were dislocated from the poor neighborhoods where they resided leading to further segregation between the wealthy and the poor.⁹ The two groups become completely divided after the dislocation of those living in the neighborhoods along the coastline.⁹

11. 2021 TOKYO, JAPAN

11.1 Bidding for the 2021 Games

The bid for the 2021 Olympics, originally 2020, consisted of 6 contestants of which only 3 bid: Japan, Spain, and Turkey.² The bid was taken to 3 rounds in which Japan beat Turkey 60:36. After a crushing defeat to Brazil while spending \$150 million this was a much-needed win for Japan.² However, due to the dubious pandemic, the 2020 Games were delayed to 2021.²

11.2 Infrastructure

General Infrastructure: Japan spent most of its \$30 billion spendings on road improvements and networking roads to different Olympic venues.¹⁵ Recent infrastructures that were once destroyed by earthquakes were developed as the Olympics finally gave Japan a reason to.¹⁵ The launch of the Tokaido Shinkansen (bullet train) was announced along with many developments of new highways and main roads.¹⁴ Existing roads were improved to serve as bus load zones which helped to reduce traffic congestion due to the influx of tourists.¹⁴

Olympic Infrastructure: Having held the Olympics before, Japan was able to reuse many facilities, minimalizing the cost of Olympic infrastructure needed.¹⁴ The Olympic facilities used consisted of temporary structures for sports management, Tokyo 2020 Organising Committee office space, power supplies, IT services, Olympic Stadium, Tokyo Metropolitan Gymnasium, Yoyogi National Stadium, Nippon Budokan, and many more. \$14 billion was also spent on hotel upgrades which served to be a waste as the pandemic restricted visitors.¹⁴

11.3 Results

The 2021 Olympics resulted in a huge loss for Japan due to the lack of tourists.¹⁴ This led to no profits on ticket sales, food, hotels, etc.¹ However, most of Japan's spending went towards general infrastructure development which resulted in benefits for Japan in the long run.¹⁵ Japan was able to develop billions of dollars in infrastructure that would never happen if it weren't for the Olympics.¹⁵ Thousands of new apartments were able to be constructed along with a help recovery from disasters such as earthquakes, tsunamis, and nuclear disasters that Japan has faced in recent years.¹³

Tokyo was also able to implement a very Green Olympics in which most of the resources used to accommodate tourists and athletes were recyclable.⁹ Recyclable cardboard beds, used and renewable electricity sources, and minimized waste at competitions were all implemented to assure a greener Games than that before.⁹

Tokyo was also able to see a variety of sponsorships of players and teams. Nike, Coca-Cola, NBC, Visa, Toyota, Pepsi, Gatorade, Adidas, McDonald's, and Wheaties all were able to sponsor athletes in the Tokyo Games which shows different methods that the Olympics could help grow businesses, small or large.¹⁹

12. ENVIRONMENTAL & ECONOMIC IMPACTS

Although many precautions were taken to prevent catastrophic outcomes from the Olympics, the results were still devastating. Such an example resides in the 2022 Beijing Winter Olympics in which artificial snow was utilized to accommodate for the lack of snow.³ This snow led to an estimated 500 million gallons of water and macroscale energy sources stripping essential water from farmers and residents who were already facing a water shortage.³ Along with these factors, the ski paths run through Songshan Nature Reserve, a protected forest ecosystem in Beijing.³ The artificial snow of these ski paths destroyed the ecosystem as it caused the destruction of native vegetation and caused erosion and landslides.³

The construction of many new projects also causes a large influx in carbon emissions and resource consumption.³ With machines and technology constantly working on new projects to accommodate the Olympic Games, large amounts of toxic chemical gases are released into the atmosphere, harming the local region and the entire world.³ Also, the Olympics causes a large number of people in one specific location causing resources in that region to deplete rapidly.³ Not only does this

harm the region through resources, but it also contributes to large carbon emissions due to overworking machinery.³ Carbon emissions that could once be reversed over time are no longer in the same playfield as machines used to build new infrastructure release too much carbon.³ The carbon adding up catalyzes climate change; studies show that only 1 of the 21 cities that have hosted the Winter Olympics will be able to do so by the end of the century.¹⁴ Furthermore, by 2085, an estimated 5% of the Northern Hemisphere will be cool enough to host the Summer Olympics.³ Climate change can also lead to alterations in geography.¹⁴ By 2050, most European host locations will not be reliable enough to host the Olympics defeating the unification aspect of the Olympics. All these factors along with others such as deforestation in South Korea, air pollution in Beijing, and illegal dumping in Russia leave a longstanding detriment to the host city's environment.¹⁷

Although countries such as Japan, the USA, and China are starting to take initiative to combat the carbon emissions left by the Olympics, it is largely unsuccessful. Most plans to combat such problems were often left abandoned, shown through unused facilities in Beijing which were once supposed to be transformed into publicly accessible commodities. Also, initiatives to build green sources and plant trees are then canceled out by large businesses producing more carbon in response to new green sources.⁹ In the end, the Olympics' carbon emission is largely unresolved as an effective solution to not only maintain facilities but combat the overall emission caused due to construction and technology that has not been developed.

13. INFRASTRUCTURE IMPACTS

Infrastructure development showed various impacts on its host city, ranging from devastation to increased efficiency in society. Cities such as Rio and Athens faced great detriments from building infrastructure while others such as Japan and the USA benefited from the action. The key distinction between such differences was from 2 factors, ambition and time management. Cities that failed to manage their time often had large ambitious plans that were submitted in their bid to the IOC. This left little time to finish large projects resulting in a highly accelerated price of building infrastructure. With little time comes mistakes as rushed projects inevitably result in miscalculations, misbuilding, etc. This ultimately leads to maintenance costs skyrocketing in mistakes that shouldn't be made in the first place. The already debted country cannot afford these structures ultimately resulting in abandonment. An example of this is shown through Sochi's railway costing around \$12 billion. A year after the Olympics, the railway remains practically unused and due to the costs, residents have paid for it through their taxes.

Those with already developed infrastructure often see great amounts of prosperity after the Olympic Games. Through the Olympics, countries such as the US and Japan were able to catalyze plans for infrastructure. With minimal spending on new venues and most of their budget spent on general infrastructure, developed countries rarely face huge losses due to the Olympics. If the expected revenue is not met, money spent on the event can be seen as an improvement to roads, highways, bridges, railways, etc. ultimately turning the loss into a profit. Such an example is shown through the Utah 2002 Winter Olympics in which the event was used to prevent delays that often follow large construction and/or renovations. The Olympics gave an excuse to prioritize road improvements, improvements that will be utilized by all for decades to come.

14. CONCLUSION

The Olympic outcome often follows a striking pattern shown through past games. Without proper preparation, the Games can result in a devastating outcome as shown by several cities filing for bankruptcy. However, if prepared and accommodated properly, the Olympics can result in a great profit for host cities. With the benefits to improve infrastructure, improve tourism, improve economy, improved sports participation, and public health, and overall raise a sense of nationalism within the nation. The IOC should base the bidding process on the most qualified applicants rather than those who have the most ambition, as basing bidding on ambition can lead to determinants that occurred in cities such as Rio and Athens.

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