Air Connectivity and Proximity of Large Airports as an Added Value for Museums

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Museum studies is an academic and practical field of research that provides new challenges and opportunities to researchers thanks to the extraordinary growth of museums worldwide in the last 20 years (McCarthy and Brown 2022). There is, however, a need for more research on museum economics, including tourism (Silberberg and Lord 2015). The tourism industry has become the cornerstone of the economy for most of the world’s tourist destinations thanks to the aviation industry, especially in the capital cities of developed countries where large airports are localized, as well as providing a high level of connectivity in the rest of the country. Tourism is highly dependent on the aviation sector (Florido-Benítez 2022a; 2022b). The World Tourism Organization (UNWTO) indicates that air travel is the most popular choice of travel for leisure tourism (UNWTO 2020; 2021), and inside the tourism industry, museums represent a growing attraction for international tourists (Nowacki and Kruczek 2021). They help drive the tourism and aviation sectors, and play a cultural and economic role in their communities (Florido-Benítez 2023; Maxim 2017).

City museums around the world empower their visitors to consider their roles as active city comakers (Grincheva 2022). “Superstar museums,” which are a “must see” for tourists and have achieved cult status (Frey 1998), depend on digital and physical positioning in the media (Plaza et al. 2022). However, museums have been severely affected by the coronavirus pandemic and its associated negative consequences. ICOM observed that 95 percent of museums around the world “were forced to close in order to safeguard the well-being of staff and visitors in 2020” (ICOM 2021), and the Network of European Museum Organizations came to similar conclusions (NEMO 2020). Nevertheless, now that museums are once again regularly visited by tourists, destinations marketing organizations (DMOs) must ensure connectivity and accessibility to museums through airports and airlines. DMOs manage marketing strategies and communication channels at destinations (Slocum 2021) through promotional campaigns and digital tools, as most tourists arrive by air at these destinations, with the aim of attracting tourists and convincing them to visit the tourist attractions. Most museums are localized in urban centers, towns, and cities; therefore, DMOs must manage marketing in a dynamic and inclusive way in order to cater for the complexity, diversity, and dynamism of urban tourism (Romero-García et al. 2019).

A critical literature review is necessary to evaluate the impact of airports on museums. Many studies have been conducted to examine the direct effects of airports on the development of tourist attractions, but there are limited studies on this topic and much less work examining the context of airports and their relationship with museums. To fill this gap, the main challenge of this study is to analyze the proximity and air connectivity of large airports in the top 20 museums worldwide from 2012 to 2021, as a result of profound changes that aviation and museum industries activities are experiencing due to the pandemic crisis (see Choi 2021; Choi and Kim 2021). Moreover, this study evaluates major cities and promotion factors with the aim of attracting more visitors to museums and considers how these two variables can affect museums and airports. As connectors of spatial developments within their territory, airports along with tourism planning and development policies are under-researched in the literature of tourism and aviation industries (Freestone and Baker 2011; Knippenberger 2010). For instance, Catherine Pretince
and coauthors (2021) suggest that airports and DMO operators must improve the connectivity and brand image of destinations to increase tourism flow into the host city. As stated by Roberto Díez-Pisionero (2019), airports enable the materialization of the connectivity that every city requires to provide global accessibility.

**Literature Review: Promotion Strategies and Brand Image as Marketing Tools**

The identity and brand positioning of museums play an important role in digital marketing, advertising, promotion, and the internationalization of museums (Sylaiou and Papaioannou 2019). For instance, the brand image of museums empowers their special features and can distinguish them from their competitors. See, for example, the National Museum of Natural History at the Smithsonian, the Metropolitan Museum of Art, The British Museum, the Louvre, and Centre Pompidou amongst many others. Stella Sylaiou and Georgios Papaioannou (2019) suggest that museum brand positioning is also related to promotion strategies implemented via various marketing techniques. Promotion strategies alone will not achieve the desired results, so museum managers must explore other means to attract new visitor profiles (Davies 2005). Cultural and historical variables are important motivational factors in bringing international tourists who aim to recognize and learn about the value of a place (Ab Dulhamid et al. 2022). In 2022, for example, the Dalí Museum in St. Petersburg, Florida, combined promotion campaigns in airports and social media, and its result was quite positive, seeing a 44 percent increase in museum traffic, a 53 percent increase in unique visitors to the museum, and a 201 percent increase in social engagement (Spark n.d.).

Marketing communication is a concise aspect of modern museum management. Major museums, such as the Louvre and the Metropolitan, are interested in expanding their brand image either through licensing or exploration of new facilities in different tourist destinations around the world. Susana Fernandez-Lores and coauthors (2022) show that museums use different digital communication tools to enhance user experience and generate visitor traffic to the museum. For example, a museum website plays an important role in attracting future visitors, both physical and virtual (Kabassi 2019), or in designing promotion campaigns through social media like Twitter to attract visitors and improve public engagement (Kydros and Vrana 2021). Museum staff must actively employ joint marketing strategies, and other creative and resilient initiatives in these uncertain times of crises such as pandemics and Russia’s war with Ukraine (Rivera 2022).

I have suggested (Florido-Benítez 2021a, 2022a) that universalizing a company’s brand app can effectively increase the number of users in direct contact with it, thereby promoting products and services internationally in a more immediate way. A study carried out by Xueting Dou and coauthors (2021) revealed that the mobile app promoting context-related souvenirs positively affects museum visitors’ souvenir purchase intention without undermining their experiential quality. Indeed, the competitive tourist destination market in which a museum is located should influence decisions on marketing strategies for the museum (Siano et al. 2010). Marketing promotion strategies are a must for communicating effectively with visitors to increase the number of visits and promote the museum role through its brand image (Mavragani 2018). For instance, the DMO of Paris and Le Parc de La Villette promoted the Tutankhamun touring exhibition through their official websites and social media in 2019, and the result was a complete success—this travelling exhibition was visited by 1.4 million visitors overall, with some 7,735 visitors a day. This broke Paris’s previous record for a Tutankhamun exhibition, set back in 1967 (Sharpe and da Silva 2020).

**Methods: Data Collection**

The airplane is the major means of connectivity for people travelling for both tourism and leisure (Seguí and Reynés 2010), and connectivity is determined by supply (flights) and demand (passengers). In fact, connectivity is an important variable in passengers’ route choice, and it has been used in tourism and aviation studies as an explanatory variable (Burghouwt and Redondi 2013), because different variables must be used to analyze air connectivity, such as type of airports, cities, runways, capacity of aircraft, location, average travel time, or the number of direct and indirect connections between two airports (Calatayud et
al. 2016). For instance, travel time, ticket price, airport access, and public transport around the airport are all research variables used to measure connectivity at airports (Arvis and Shepherd 2011).

Recent evidence suggests that growth in air connectivity brings benefits to consumers, businesses, and tourist destinations by decreasing travel costs and time, facilitating contacts and trade, and stimulating productivity and investments (Burghouwt 2015; Burghouwt and de Wit 2015). The investigation of the likely benefits of air services on tourism in the context of tourist destinations is a significant area of interest in both tourism and aviation research (Dobruszkes and Mondou 2013; Florido-Benítez 2022a; Graham et al. 2008). Aviation is an essential factor for local economic growth, especially for firms, DMOs, governments, and organizations who demand good air connectivity to help cities pursue successful internationalization strategies (Antunes et al. 2020).

We conducted our research project on the air connectivity and proximity of large airports in relation to the top 20 museums. This research builds on previous studies related to this topic (Díez-Pisionero 2019; Doerr et al. 2020; Florido-Benítez 2023; Syafi'i et al. 2022; Yang et al. 2022) to identify and analyze the airport’s impact on museums, with the aim of improving promotion strategies in the future by airport-airline-museums-DMO in a more efficient and effective way. Thomas Bieger and Andreas Wittmer (2006) suggest that air transport is the main form of transport to many tourist destinations; in some cases it constitutes up to 100 percent of the international tourism arrivals. It is good for museums to engage with the differences and fluctuations of data, because this information helps them to recognize what drives changes in attendance of visitors (TEA/AECOM 2018, 2020, 2021). Visitor arrivals are the most used metric in this type of research (Song and Li 2008), because this data is most easily obtained from organizations and private companies.

Airports selected for this research were based on several databases provided by the Federal Aviation Administration (FAA) (2021a 2021b), Aeroporti di Roma (2021), Aeropuertos Españoles Navegación Aérea (AENA) (2021), Japan Schedule Coordination (2021), Federal Air Transport Agency (2021), Civil Aviation Authority (CAA) (2021), Groupe ADP (2021), Civil Aviation Administration of China (CAAC) (2021), and the Taoyuan International Airport Corporation (2021). We collected data for large airports from 2012 to 2021 because data from 2022 was not available. Besides, we decided to rely on the most recent and best dataset available. Data was collected using four steps:

1. **Category of airport**: Airports were selected according to their categories. US law categorizes airports by the type of activities, including commercial service, primary, cargo service, reliever, and general aviation airports (FAA 2021a). Table 1 displays the categories of the 16 airports selected in this study. Airport categorizations offer a basis from which to derive representative scenarios for air traffic-related simulation purposes (Öttl and Böck 2011), and a competitive advantage that is related to passenger activities, such as spatial and facility factors (Park 2003). Antonín Kazda and coauthors (2020) suggest a five-parameter classification: geography of the airport; size/capacity of the airport; the airport territory; connectivity; ownership; and participation in an airport network. Recently, Ka-Han Song and Wonho Suh (2022) conducted an empirical study on the development and operations of South Korean airports, and they claim that the development around these airports was an added value to design joint promotion and operation strategies at airports and cities. Table 2 shows airports selected by countries, according to the top 20 museum locations analyzed in this research. These show the total number of passenger arrivals from 2012 to 2021. Moreover, the number of passenger arrivals per year by airport is also shown in Figure 1. This data helps us evaluate which airports deliver more tourists to the destination and also helps us analyze the proximity of these airports to museums by passenger arrivals.

2. **Location of airport**: The proximity of airports to distribution facilities and smaller airports at a distance from major metropolitan areas are part of vertical integration between airports, airlines, and cities, with the aim of offering the best connectivity. Figure 2 is a map of airport locations, with estimated time by car and subway from airports to museum locations. This data was taken directly from Google Maps (accessed 2 January 2022). Mueller and Aravazhi (2020) claim that the geographical location of an airport is a driver of an airport's connectivity, which is a key driver for growth, especially for the attractive tourist destinations (Dimitriou and Sartzataki 2018). Specifically, we look at characteristics linked to airport location and the proximity to museums by car (Ishi et al. 2009; Loo 2008; Loo et al. 2008), because of the major role played by cars in the modal split towards departure airports; such an indicator can be interpreted as a proxy attribute of accessibility, representing a measure of how easily a user can access a car to reach the
departure airport (Luca 2012). Anil Yazici and coauthors (2016) found that spatial variables related to the airport’s proximity had the highest impact on taxi drivers’ airport pickup decisions.

3. Top 20 museums worldwide: This study considers the top 20 museums worldwide according to Themed Entertainment Association (TEA/AECOM) (2012–2021), and Smithsonian (2021) data. Each museum is located per country, as we can see in Figure 4. Annual attendance data for museums from 2012 to 2021 is shown in Figure 3, allowing us to examine the relationship between the number of museum visitors and passenger arrivals at selected airports. It is really difficult to count the number of visitors who go to a museum, and to know if they arrived in the city by airplane, for the reason that museum managers do not provide this information (Davies 2005). Visitor flow management is a central issue for world-leading museums. Museum managers are constantly challenged by the need to maximize the number of visitors (Kontarinis et al. 2017). Yet, this involves highly complex issues, such as continuous and reliable data acquisition, complexity reduction, and modelling physical and psychological aspects of crowd movement (Centorrino et al. 2019).

4. Other data relevant to the study: A range of other data relevant for this study, such as promotions, the global vision for the aviation industry, the situation with museums worldwide particularly with regard to the pandemic scenario, and other information on museum visitation were drawn from the International Council of Museums, the Network of European Museum Organizations, and the Smithsonian, as well as UNTWO, IATA, FAA, CAA, and CAAC, in order to show readers how airports, museums, and DMOs have to promote mixed activities to attract tourists to cities. Air transport, airport infrastructure, efficient and safe airline services, and worldwide air transport networks are essential support for tourism (Lohmann and Duval 2014). In aviation studies, data science and analytics have stimulated new research ideas, knowledge, theories, techniques, and applications. This has resulted in many new insights and solutions to previously unsolved problems (Chung et al. 2020).

Data Analysis: Airport Proximity and Connectivity as a Competitive Advantage for Museums

Airports and airlines are affected by several indicators (that is, the weather, proximity to the city center, frequency of flights, public transport, and number of passengers, among others) when they are operating at destinations. In the next subsections, we show the results of the research to help readers encapsulate themes explored in the literature review, and which basically advocate that airport proximity and connectivity benefit museums. Table 1 shows the category of the largest airports analyzed in this study, such as PEK, LHR, CDG, PVG, MAD, SHA, LGW, FCO, TPE, ORY, JFK, LED, LGA, IAD, and DCA. The TSA airport in Taiwan is categorized as a medium airport. The category of airport is qualitative data that must also be discussed increasingly in the context of this article and future studies. For example, the largest airports carry more passengers to the destination, and they are also located closest to museums. This is one of the main reasons why it is recommended that DMOs, airports, and stakeholders participate actively in air transport planning projects to improve the connectivity of destinations (Yang et al. 2019), because air transport connectivity has a great influence on tourist flows (Florido-Benítez 2021b).

Table 1. Categories of airports

<table>
<thead>
<tr>
<th>Airport category</th>
<th>By passengers</th>
<th>Airports analysed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large hub (L)</td>
<td>6,610,695 or greater</td>
<td>15</td>
</tr>
<tr>
<td>Medium hub (M)</td>
<td>6,610,694–1,652,674</td>
<td>1</td>
</tr>
<tr>
<td>Small hub (S)</td>
<td>1,652,674–330,534</td>
<td>1</td>
</tr>
<tr>
<td>Non-hub (N)</td>
<td>330,534–10,001</td>
<td>–</td>
</tr>
<tr>
<td>Total airports</td>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>

Source: Author
In addition, Table 2 presents airports by IATA code, category, and number of total passengers. Data from Table 2 reveals the significance of airports in the flow of tourist demand, accessibility, and connectivity to cities. Beijing (PEK) airport received 800 million passengers in the period analyzed, followed by Heathrow in London with 647 million passengers, and in third place the Charles de Gaulle (CDG) airport outside Paris, which received 585 million passengers. Doubtless, many of these passengers visited the major museums in Beijing, London, and Paris.

Table 2 also illustrates the total passenger’s arrivals in % by sixteen airports (2012-2021), and the main four airports are the PEK airport with 14.6%, followed by LHR (11.8%), CDG (10.7%), and the PGV airport with 10%. The rest of the airports are 8 percent below, but all of them are part of a network of airport connections in their countries, which provide accessibility and connectivity to great cities and tourists who

<table>
<thead>
<tr>
<th>Rank</th>
<th>IATA Code</th>
<th>Airport Name</th>
<th>City/Country</th>
<th>Category</th>
<th>Visitors (2012–2021)</th>
<th>% of Total (2012–2021)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PEK</td>
<td>Beijing Capital International</td>
<td>Beijing/China</td>
<td>L</td>
<td>799,999,095</td>
<td>14.6%</td>
</tr>
<tr>
<td>2</td>
<td>LHR</td>
<td>Heathrow</td>
<td>London/UK</td>
<td>L</td>
<td>646,892,524</td>
<td>11.8%</td>
</tr>
<tr>
<td>3</td>
<td>CDG</td>
<td>Paris Charles de Gaulle</td>
<td>Paris/France</td>
<td>L</td>
<td>585,483,954</td>
<td>10.7%</td>
</tr>
<tr>
<td>4</td>
<td>PVG</td>
<td>Shanghai Pudong International</td>
<td>Pudong/China</td>
<td>L</td>
<td>552,972,762</td>
<td>10.1%</td>
</tr>
<tr>
<td>5</td>
<td>MAD</td>
<td>Adolfo Suárez Madrid-Barajas</td>
<td>Barajas/Spain</td>
<td>L</td>
<td>437,985,463</td>
<td>8.0%</td>
</tr>
<tr>
<td>6</td>
<td>SHA</td>
<td>Shanghai Hongqiao Inter.</td>
<td>Changning-Minhang/China</td>
<td>L</td>
<td>382,473,427</td>
<td>7.0%</td>
</tr>
<tr>
<td>7</td>
<td>FCO</td>
<td>Leonardo da Vinci-Fiumicino</td>
<td>Roma/Italy</td>
<td>L</td>
<td>354,845,569</td>
<td>6.5%</td>
</tr>
<tr>
<td>8</td>
<td>LGW</td>
<td>Gatwick</td>
<td>Crawley/UK</td>
<td>L</td>
<td>344,771,395</td>
<td>6.3%</td>
</tr>
<tr>
<td>9</td>
<td>TPE</td>
<td>Taiwan Taoyuan International</td>
<td>Taoyuan/Taiwan</td>
<td>L</td>
<td>324,508,107</td>
<td>5.9%</td>
</tr>
<tr>
<td>10</td>
<td>ORY</td>
<td>Paris-Orly</td>
<td>Orly/France</td>
<td>L</td>
<td>268,200,000</td>
<td>4.9%</td>
</tr>
<tr>
<td>11</td>
<td>JFK</td>
<td>John F Kennedy International</td>
<td>New York/US</td>
<td>L</td>
<td>248,914,827</td>
<td>4.5%</td>
</tr>
<tr>
<td>12</td>
<td>LED</td>
<td>Pulkovo</td>
<td>St Petersburg/Russia</td>
<td>L</td>
<td>148,249,758</td>
<td>2.7%</td>
</tr>
<tr>
<td>13</td>
<td>LGA</td>
<td>La Guardia</td>
<td>New York/US</td>
<td>L</td>
<td>125,742,895</td>
<td>2.3%</td>
</tr>
<tr>
<td>15</td>
<td>IAD</td>
<td>Washington Dulles International</td>
<td>Chantilly/US</td>
<td>L</td>
<td>98,326,777</td>
<td>1.8%</td>
</tr>
<tr>
<td>16</td>
<td>TSA</td>
<td>Taipei Songshan</td>
<td>Taipei/Taiwan</td>
<td>M</td>
<td>52,940,707</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

**Source:** Author
want to visit museums and the rest of tourist attractions. Airports with high connectivity through airlines contribute to improving international and national tourist flows (Iñiguez et al. 2014). The proximity of an airport to the city represents a development opportunity for tourist attractions (Piotrowska-Trybull and Sirko 2022).

Furthermore, Figure 1 shows the overall growth in passenger arrivals at 16 airports from 2012 to 2021. We can see that the PEK airport in Beijing is first placed in terms of passenger arrivals, followed by LHR, CDG, and PVG, with the rest of the airports maintaining steady growth before the pandemic. After 11 March 2020, all airports suffered a dramatic drop in passenger arrivals, especially the large airports, where airlines decreased their departure operations by 74 percent (Hotle and Mumbower 2021), a figure unseen and undocumented to date in the aviation sector. However, after the World Health Organization (WHO) declared the COVID-19 global pandemic on 11 March 2020, the number of international and domestic flights dropped by half until the second half of March 2020 in US airports. Many flights were maintained by airlines because they had to keep flying routes to receive financial aid (Monmousseau et al. 2020). The situation with airlines going bankrupt directly and indirectly affected tourist destinations, airports, and local and regional economies (Florido-Benítez 2021b).

Figure 2 shows airport proximity to the top 20 museums worldwide, and how they provide more or fewer visitors to museums depending on how close they are to them. Among the most important airports...
Figure 2. Airport proximity to museums by car and subway.

Note that the estimated times for numbers 6, 8, 9, 10, and 18 (London, UK) were measured by subway, since the route by subway took less time than by car. Moreover, estimated time by car also includes toll motorways.
that have a close proximity-time relationship to local museums are DCA in Arlington (6 minutes), followed by TSA in Taipei (12 minutes), LGA in New York (14 minutes), and the MAD airport in Madrid (19 minutes). In general terms, local museums in New York and Washington DC accrue the greatest benefits from their proximity to airports via travel by car. Also, it is worth highlighting that the Tube is the best transportation alternative to cars in the case of London museums. Overall, airports are near-destination links that contribute to the development of tourism in the region where they are located (Tang et al. 2017). They are key partners in the tourist services chain, as seen through the lens of tourism management (Bezerra and Gomes 2019). We should not forget, however, that we have seen that the pandemic has brought about a reduction in the volumes of domestic and international air passenger traffic in most countries worldwide (Florido-Benítez 2021c).

Museums as a Symbol of Identity for Large Capital Cities

Most capital cities worldwide can be recognized through one or several famous museums or sights that are international tourist attractions; for example Paris has the Louvre and the Eiffel Tower; Madrid has Museo del Prado; Rome has the Vatican Museums; New York has The Metropolitan Museum; Florence has Uffizi Gallery and Accademia Gallery; and London has The British Museum. Many cities now have heritage and tourism policies and marketing promotion strategies that include local museums. Large capital cities make significant use of their tourist attractions to assert their symbolic identity, and so demonstrate internationally their status as “icons.” Most capitals strive to be distinct, to differentiate themselves from other cities, and to maintain a certain symbolic primacy (Saidi 2012). Museums are an attractive tourist product in the twenty-first century, bringing their cities economic benefits as well as new challenges and innovative processes in educational, cultural, scientific, and technological terms.

Table 3 and Figure 3 show the number of visitors at the top 20 museums worldwide from 2012 to 2021. Individuals often rely on visitation or attendance numbers as the primary indicator of a museum’s or destination’s ability to attract visitors. The most prestigious ranking of museums worldwide is based entirely on attendance, so by this metric, the Louvre in Paris is seen as the most popular museum in the world with 77 million visitors within the prescribed period (TEA/AECOM 2021). This is followed by the National Museum of China in Beijing with 62 million visitors, the Metropolitan Museum of Art (New York) with 55.9 million visitors, the National Museum of Natural History (Washington, DC) with 53.5 million visitors, The British Museum (London) with 52.8 million visitors, the National Air and Space Museum (Washington, DC) with 51.9 million visitors, the Vatican Museums (Rome) with 51.7 million visitors, the National Gallery (London) with 49.7 million visitors, and the Tate Modern (London) with 46.7 million visitors. As Eleni Mavragani argues, museums and cultural monuments are essential for tourists as important reasons for visiting a particular tourist destination (Mavragani 2018). The pandemic has been an opportunity to promote museums as vehicles for connection among older people, their families and communities. Indeed, the number of visitors increased by an average 39 percent of the total of museums in 2021. These results suggest that the museum sector has begun to return to the levels seen prior to the pandemic. It is important to highlight that in the period analyzed, the top 20 museums were visited by approximately 900 million visitors, which clearly illustrates the overall importance of museums for tourism and economic development in cities.

The remaining museums in the top 20 are below 45 million visitors or 5 percent of the total 868 million visitors in the period analyzed (see Table 3). These results are very important to large capital cities, which are highly dependent on the tourism sector. Nevertheless, the pandemic and mandatory closures have left museums in a difficult position. In 2020, the visits to these 20 museums decreased by 78 percent on average (Cheu 2020). Museums were one of the visitor attraction categories most severely affected by COVID-19, subject to rigorous capacity limits and control measures due to being primarily indoor facilities, and there were severe funding challenges leading to staff layoffs.

As stated by Morrison and Maxin (2021), city tourism is a system that involves a great deal more than just what visitors do in urban areas, such as visiting museums and theatres or attending orchestral concerts. Cities need to plan and manage, as there are multiple stakeholders to be considered, including museum
Table 3. Top 20 museums worldwide by number of visitors (2012–2021).

<table>
<thead>
<tr>
<th>Rank</th>
<th>Museum</th>
<th>Location</th>
<th>Free/Paid</th>
<th>Visitors (2012–2021)</th>
<th>% of Total (2012–2021)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Louvre</td>
<td>Paris, France</td>
<td>P</td>
<td>77,879,000</td>
<td>8.76%</td>
</tr>
<tr>
<td>2</td>
<td>National Museum of China</td>
<td>Beijing, China</td>
<td>F</td>
<td>62,061,000</td>
<td>6.98%</td>
</tr>
<tr>
<td>3</td>
<td>The Metropolitan Museum of Art</td>
<td>New York, USA</td>
<td>P</td>
<td>55,889,000</td>
<td>6.29%</td>
</tr>
<tr>
<td>4</td>
<td>National Museum of Natural History</td>
<td>Washington, DC, USA</td>
<td>F</td>
<td>53,455,000</td>
<td>6.01%</td>
</tr>
<tr>
<td>5</td>
<td>British Museum</td>
<td>London, UK</td>
<td>F</td>
<td>52,799,000</td>
<td>5.94%</td>
</tr>
<tr>
<td>6</td>
<td>National Air and Space Museum</td>
<td>Washington, DC, USA</td>
<td>F</td>
<td>51,948,000</td>
<td>5.84%</td>
</tr>
<tr>
<td>7</td>
<td>Vatican Museums</td>
<td>Vatican, Vatican (Italy)</td>
<td>P</td>
<td>51,750,000</td>
<td>5.82%</td>
</tr>
<tr>
<td>8</td>
<td>National Gallery</td>
<td>London, UK</td>
<td>F</td>
<td>49,685,000</td>
<td>5.59%</td>
</tr>
<tr>
<td>9</td>
<td>Tate Modern</td>
<td>London, UK</td>
<td>F</td>
<td>46,713,000</td>
<td>5.25%</td>
</tr>
<tr>
<td>10</td>
<td>Natural History Museum</td>
<td>London, UK</td>
<td>F</td>
<td>43,328,000</td>
<td>4.87%</td>
</tr>
<tr>
<td>11</td>
<td>Shanghai Science &amp; Technology Museum</td>
<td>Shanghai, China</td>
<td>F</td>
<td>41,778,000</td>
<td>4.70%</td>
</tr>
<tr>
<td>12</td>
<td>American Museum of Natural History*</td>
<td>New York, USA</td>
<td>P</td>
<td>40,500,000</td>
<td>4.55%</td>
</tr>
<tr>
<td>13</td>
<td>National Palace Museum Taiwan</td>
<td>Taipei, Taiwan</td>
<td>P</td>
<td>37,317,000</td>
<td>4.20%</td>
</tr>
<tr>
<td>14</td>
<td>National Gallery of Art</td>
<td>Washington, DC, USA</td>
<td>F</td>
<td>36,702,000</td>
<td>4.13%</td>
</tr>
<tr>
<td>15</td>
<td>State Hermitage</td>
<td>St Petersburg, Russia</td>
<td>P</td>
<td>33,026,000</td>
<td>3.71%</td>
</tr>
<tr>
<td>16</td>
<td>National Museum of American History</td>
<td>Washington, DC, USA</td>
<td>F</td>
<td>32,881,000</td>
<td>3.70%</td>
</tr>
<tr>
<td>17</td>
<td>China Science Technology Museum</td>
<td>Beijing, China</td>
<td>P</td>
<td>31,572,000</td>
<td>3.55%</td>
</tr>
<tr>
<td>18</td>
<td>Reina Sofia</td>
<td>Madrid, Spain</td>
<td>P</td>
<td>30,340,000</td>
<td>3.41%</td>
</tr>
<tr>
<td>19</td>
<td>Centre Pompidou</td>
<td>Paris, France</td>
<td>P</td>
<td>30,007,000</td>
<td>3.37%</td>
</tr>
<tr>
<td>20</td>
<td>Victoria &amp; Albert Museum</td>
<td>London, UK</td>
<td>P</td>
<td>29,565,000</td>
<td>3.32%</td>
</tr>
<tr>
<td></td>
<td>Total visitors</td>
<td></td>
<td></td>
<td>868,178,000</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Source: Author.
visitors, residents, and tourism owners and staff. Indeed, demand includes the visitors to cities as well as factors that influence people in making travel decisions, how they make bookings, travel, and recall their memories of trips. Cities like Madrid, Beijing, Taipei, Paris, Berlin, and Shanghai have successfully diversified their markets to attract tourists on holidays or vacations.

**Top 20 Museums Worldwide: Location and Proximity to Airports**

Airport location is an added value to cities. Seul Ki Lee and SooCheong Jang (2011) have revealed that travelers stay in airport hotels as they travel to the city’s central business district or tourist attractions, not vice versa. In this light, airport proximity needs to be examined in comparison to city centers and
other locations of interest that are the ultimate destinations of the travelers. For instance, taxi service is an important component of airport ground access, which affects the economic competitiveness of an airport and its potential positive impact on the surrounding region. Airports across the globe experience both shortages and excesses of taxis due to various factors, such as the airport’s proximity to the city center, timing and frequency of flights, and the fare structure (Yazici et al. 2016). Muhammad Syafi’i and coauthors (2022) demonstrated that the airport’s location and proximity to the capital city are vital to tourism and economic development in terms of tourism demand, mobility, and tourist attractions.

Figure 4 shows the locations and airport proximity for the top 20 museums worldwide. This study has selected those airports that are strategically located less than one hour from airport to museum by car and subway, with the rest of the airports located more than one hour from airport to museum by car. According to Tom Rallis and Jens Peen (1990), travel times to airports are approximately two to three times greater by public transport than by private vehicles because of a 15-20 percent shorter distance on average available to private vehicles. If traveling 10 kilometers takes 35 minutes by private vehicles, then it would take 65 minutes by public transportation. Therefore, airport travelers often cannot depend on the average access time by public transport and, thereby, risk missing a flight connection. Moreover, depending on the distance, access time also depends on the form or layout of the city. Travel time in a satellite or linear city is three times more than in a multicenter city. From a capacity management perspective, the location of urban centers, festivals, museums, and theme parks is a very important factor to consider when DMOs design marketing strategies with other tourist attractions nearby (Coca-Stefaniak 2019).

Findings of the current study confirm that the high concentration of museums in Washington, DC, New York, and London benefit directly from their proximity to and connectivity with airports. Two indicators influence connectivity: the importance of one-stop versus nonstop service, and the quality of a destination airport (Florido-Benítez 2021c). A study carried out by Enrico Bertacchini and coauthors (2021) revealed that most visits to museums (73 percent) are concentrated within a distance range of one to two hours, where the main tourist attractions are also located. Moreover, museums located within a 30-minute time range have attracted about 18 percent of visits. In fact, the average number of visits per museum tends to decrease as distance increases. This confirms that the metropolitan area, with its concentration and quality of museums, galleries, and exhibitions, tends to capture the largest share of visits. International visitors prefer to go to museums near the hotels where they usually stay when visiting the city (Vu et al. 2018).
Discussion

This research cannot predict the future of airports and museums, but we can capture a snapshot of the present global situation that suggests how they could improve their operability in times of economic uncertainty. In future, museums, tourism, and aviation industries will be exposed to many hazards and obstacles (that is, economic crises, pandemics, wars, extreme climate events, terrorist attacks, etc.) that will compromise supply chain efficiency and profitability of their daily operations. To reduce these risks and barriers, airport operators, museums, and DMOs must design collaborative and integrated frameworks of contingency at destinations, with the aim of being more resilient in times of uncertainty and fluctuations in demand from visitors, passengers, and tourists.

Our research suggests the need to implement joint strategic alliances by DMOs, airports, and museums, with the aim of increasing the number of tourists in the cities. The results of this study support the argument that airports and large capitals with their tourist attractions and marketing promotion strategies can reinforce one another, with both benefiting from the other's capacity to communicate the city brand identity. This supports Anthony Sutcliffe's research (1979), which notes that the monumentalization of large capitals was employed for geopolitical and tourism purposes. An example of a coordinated campaign was the Rijksmuseum in Amsterdam which, in 2017, in partnership with the local DMO, and Amsterdam Airport Schiphol, designed a promotion campaign where passengers who picked up luggage at Schiphol Airport saw 10 reproductions of the Rijksmuseum collection's most famous paintings displayed at a special baggage carousel. More effort should be placed on promoting and developing new tourism products through traditional and digital marketing strategies, such as advertising and providing information that includes positive messages associated with international tourists (Florido- Benítez 2022c; Lai et al. 2022).

For instance, in 2016 the marketing team of the Natural History Museum in London created a promotion campaign called “Colour and Vision: Through the Eyes of Nature” to increase the number of visitors in the summer months. This museum is visited annually by five million visitors from around the world (Natural History Museum 2016). The Louvre provided another example of good management in marketing and promotion campaigns when the museum teamed up with Airbnb to offer two people the chance to stay one night inside the institution. The campaign promoted the museum to a young demographic to increase the number of visits. In 2019, this marketing strategy attracted worldwide press coverage (Museum Next 2022).

As in previous studies (Florido-Benítez 2021b, 2021c, 2021d; Halpern and Graham 2021), this study demonstrates that airports are intermodal nodes that integrate different long- and short-distance transport modes like airlines, high speed trains, buses, taxis, rental cars, among others. They provide accessibility, connectivity, and frequency of flights at tourist destinations, including museums. The growth in visitor demand for museum experiences requires support by airlines and airports, because these provide air connectivity and optimize tourist travel time. This finding is in accord with previous studies (Piotrowska-Trybull and Sirko 2022; Syafi’i et al. 2022; Tang et al. 2017; Vu et al. 2018). Understanding airlines’ operability is much more complex than understanding the international or country markets. Their frequency decisions do not depend only on the success of each route, but on the success of the whole network, an international network (Eugenio-Martín 2016). This report has revealed the fluctuations of visitation at museums resulting from the pandemic. Data also shows us that airports and museums have returned to the path of economic growth. In 2022, the major art capitals and their museums, like Paris, London, Rome, New York, Madrid, and Amsterdam, have been able to recover from the COVID-19 downturn, and the numbers of visits to museums have increased (Dal Verme 2023). On the other hand, Russian and Chinese museums have been considerably affected in 2022 by Russia’s invasion of Ukraine and the zero-COVID strategies implemented by the Chinese government.

Air connectivity and the proximity of large airports provide an added value for museums, because they provide accessibility, connectivity, and frequencies of flights through airlines, and they have a direct impact on the number of passenger arrivals at destinations like museums. Moreover, the growth in the number of tourists travelling by airplane has positive effects in the number of visitors at museums, tourism accommodation like hotels, personalized products and services of museums, restaurants, and shopping inside and outside of museums. DMOs must introduce different joint promotion campaigns and highlight
the qualities and unique characteristics of the destination to attract more tourists while promoting the
region as a multi-destination tourism package. Hannu Piekkola and coauthors (2014) suggest that most
of the money spent on a museum trip is for travelling, eating, accommodation, shopping, personalized
products, and services, amongst many others.

I would argue that the image of today’s cities should be that of open-air museums. A capital city ex-
presses the values of the country, its past, and a future of hope and promise (Saidi 2012). With marketing
communication techniques, the sales volume objectives of the museum’s products can be achieved, the
awareness of the museum’s image can be improved, and the museum’s attendance can be increased (Lukač
et al. 2021). Man Siu and colleagues (2022) suggest that museum managers should devise ways to enhance
visitors’ self-identity through promotional messages with a psychological appeal that can be crafted to
connect visitors with the museum’s services. Smart tourism technologies have a positive impact on creating
memorable tourism experiences for museum visitors, and are beneficial for their intention to revisit, as
well as for positive recommendations (Yang and Zhang 2022).

Conclusion

This report has examined the air connectivity and proximity of large airports as an added value for the top
20 museums worldwide. The relations between airports, museums, tourism, and marketing sectors have
been analyzed and, initially, the results of this study suggest that the business relationship between airport
connectivity and proximity and museums is a vital issue for the future of museums and tourism devel-
opment. Indeed, some museums are the cornerstone of large capital cities, such as The British Museum
in London, and are real generators of knowledge and a strategic element in the identity of the cities that
tourists really want to visit. This article contributes to a growing literature, as the relationship between
visitors and museums has gradually attracted more attention from academics in both the museology and
tourism fields (Jin et al. 2020).

We must understand the importance of airports and airlines for cities and museums in terms of acces-
sibility, connectivity, and flight frequencies, because museums receive visitors from around the world. In
2020, for instance, North American, Chinese, Japanese, and Brazilian visitors made up three quarters of
the total visits to the Louvre (France 24 2021), and probably most of them arrived in Paris by airplane.
It should also be noted that the 20 top museums analyzed here are located in the most important world
cities, which promote themselves as urban tourism destinations, and where the nexus of airport and urban
and cultural tourism planning is a key component of economic growth. With worldwide economic re-
structuring due to the pandemic and the Russia-Ukraine war, urban tourism has become the anchor for
reinventing urban economies as leisure destinations. One aspect of building successful urban tourism
destinations is the leveraging of all local potential for competitive tourism such as museums, airports,
tourist attractions, hotels, restaurants, and shopping malls, amongst many others (Carson et al. 2020;
Huijbens and Jóhannesson 2020; Rogerson 2018). Urban tourism promotion is a vital constituent of local
economic development strategies in the largest cities (Doerr et al. 2020, Rogerson 2013).

Nevertheless, this study has revealed two key factors—promotions and large capital cities—in the joint
marketing strategies of museums, airports, and DMOs. Good management of the promotional campaign
helps to increase the number of passengers at airports and on airlines, and, therefore, the number of
visitors at museums. We cannot forget that the interoperability between DMOs, museums, airports, and
stakeholders in large capital cities is a management tool which is designed to detect risks and opportunities,
with the aim of reaching and improving joint objectives for tourist destinations. Capital cities make signifi-
cant use of their tourist attractions to assert their cultural identity and so demonstrate their emblematic
symbols, such as the Louvre in Paris or the Met in New York.

This article has shown that airport connectivity and proximity to museums makes those museums
more attractive for tourists in terms of proximity and travel time. The 16 airports evaluated in this research
contribute to improving the connectivity of the 20 museums and the development of tourism in the cities
where they are located. The proximity of these airports gives more flexibility and accessibility to museum
visitors than at other airports that are more remote. In general proximity-time terms, museums located in
New York and Washington, DC see the greatest benefits of airport proximity through travel by car from the airport. Also worth highlighting is the subway as the best alternative means of transport to cars, as seen in the case of London’s museums. Most tourists appreciate having all tourist attractions to hand, so they have more time to visit the city.

To sum up, although the COVID-19 crisis is affecting tourism, museums, and aviation sectors, it is a time for reflection by all organizations involved in tourism. Joint strategic alliances must be implemented by DMOs, airports, airlines, and museums to strengthen the commercial relationships between them, and to achieve joint goals with the aim of stimulating the tourism industry in this time of uncertainty. The growth of visitor demand for museums requires support by airlines and airports, because these provide air connectivity and optimization of tourist travel in terms of time, as this article demonstrates. One of the major limitations of this study has been the lack of information related to the number of visitors and promotion campaigns by museums themselves, as they are reluctant to provide information and data on their official websites. Moreover, future research could focus on the diverse and multifaceted strategies that museums and DMOs put in place to redirect the tourism traffic to their premises. An accurate analysis of the marketing tools and communication strategies deployed to appeal to tourists and attract visitation can contribute greatly to further academic debate on this topic.

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REFERENCES


