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Superstar Museums and global media exposure: mapping the positioning of the Guggenheim Museum Bilbao through networks

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ABSTRACT

Superstar architecture can play a key role in the global positioning of museums in influential mass media, thereby successfully attracting cultural tourism (e.g. the Guggenheim Museum Bilbao, GMB). Yet, an evident shortcoming is the mapping of media positioning. The aim of this article is precisely to draw and visualize this positioning of the GMB through networks. Two innovative features characterize this study: first, from a theoretical point of view, it links the debate on Superstar Museums to the broader economic debate on Superstar Economics. Akin to Rosen's hypothesis, in the case of Superstar Museums, the media exposure is concentrated among a handful of museums. In this context, the authors highlight the role of networks. The central nodes in the networks utilized for the study, depict/stand for museums that have the maximum visibility in the international media. The second innovative feature of the article is the analysis of co-citation networks in articles of the New York Times for two periods (1995–2000 and 2014–2019). The network graphs map the results of this article: the GMB positioned itself effectively with its inauguration in 1997. In addition, 20 years later the GMB still remains quite well positioned.

1. Introduction

'Superstar Museums' are a 'must-see' for tourists and have achieved cult status (Frey 1998). Nowadays, these museums are designed by a world-class architect, have a prominent architectural design and feature paintings by world-famous artists. But to stay relevant, they need to boast of not only iconic architecture and a celebrity architect, but also of being repeatedly featured in the media, till they have ensconced themselves as a staple in the public consciousness. In our post-modern globalized world, market sustainability therefore depends, as much on positioning strongly in the media as on investment and production.

In furtherance of this, the paper aims to develop a better understanding of how Superstar Museums that are built in a second/third-tier city can attain global visibility. They

can primarily do so by centrally positioning themselves in the global media circuits. The paper, hence, will carry out an exercise to visualize the positioning of the GMB (Guggenheim Museum Bilbao) in the global media, specifically the global conventional media (e.g. newspapers), through the methodology of 'network analysis', based on co-citations of the GMB in the New York Times. This paper therefore explores/inspects a preliminary approach to mapping the positioning of art museums in the media through the means of networks.

The main reasons for adopting network analysis to map the global media positioning of Superstar Museums are the following:

First, the debate on Superstar Museums is linked to the broader economic debate relating to the Economics of Superstars, as postulated by Sherwin Rosen in his seminal paper (Rosen 1981). For the phenomenon of Superstar Museums to exist, certain conditions must exist alongside it (Frey 1998). The close attention of the media to the activities in which the superstars engage in is one such condition. Akin to Rosen's hypothesis, in the case of Superstar Museums, the media exposure is concentrated among a handful of museums. The paper is premised on the observation made in the existing literature that the effectiveness of superstar architecture is dependent on attracting increasing media attention, particularly within influential publications such as the New York Times. Places and things that are repeatedly featured in the media become publically recognized and, after a certain point, famous. Hence, Superstar Museums must become media celebrities (achieve a celebrity status) in order to attract a large number of visitors (Plaza et al. 2015). Translating this into network analysis language means museums that attract huge media attention occupy central positions in the co-citation network. Therefore, the more significant central position in the network, the museum manages to achieve, by means of co-citations, the more successful it will be in attracting global attention and setting itself up as a cultural tourist-base.

Second, within the framework of this logic, the use of superstar architectural structures such as the Guggenheim Museum Bilbao, the Louvre-Lens, or Pompidou-Metz, is instrumental. Only truly singular pieces of architecture, unique and one of a kind, can draw notable media attention and subsequent public recognition. Although distinction and singularity are fundamental for the competitiveness of a museum, it is highly risky if one solely depends on them to achieve projected public and commercial goals. The dissemination of the reputation of the museum is equally important, when it comes to gaining market advantage; through the so-called 'network channels' (Plaza et al. 2015) i.e. various inter-related entities which take an active part in image distribution.

Third, as mentioned, markets where principles of Superstar Economics operate are characterized by large, unequal media exposure, where the exposure is distributed among a handful of participants. Experts on 'network analysis' term this phenomenon 'Preferential Attachment', which means that the more connected a node is, the more likely it is to receive new links (Barabási and Albert 1999; Weidenfeld 2010; Ram, Björk, and Weidenfeld 2016). Therefore, network analysis can become a fitting tool to explore positioning. It is to be noted here that it is the accumulation of media exposure (images, articles, etc.) that serves as the explanatory variable. The accumulation of media exposure directly impacts the number of visitors and not merely the fact of the media exposure, in itself, as demonstrated by Plaza et al. (2015).

Fourth, in terms of rankings, the city of Bilbao ranks as a second tier urban area by the European standard of measurement, and a third-tier urban area by the global standard, in the reigning world ranking of cities (Derudder and Taylor 2018). This is relevant since there is a direct correlation between cities and the hierarchy of their cultural infrastructures. First tier cities will more often than not operate first tier global museums, second/third-tier cities will operate second/third-tier museums and so on (Lösch 1938; Jules-Rosette and Osborn 2020). In such a scenario, the question arises, 'How can a third-tier city position its first tier museum on the global scale?'

Fifth, this methodology of analysing visual positioning of a museum (GMB), as a result of its co-citations with some very famous museums is a schematic and straightforward way of mapping the positioning of museums in the global media circuit. In such a methodology, as mentioned previously, the central nodes in the network signify huge visibility on the internet.

Sixth, in all the existing literature on the GMB, there has been immense emphasis on answering the question of and analysing the impact of Frank Gehry's masterpiece on the local economy and the city of Bilbao. But, there is a perceived gap when it comes to analysing the pay-offs generated by the GMB as a result of its direct access to well-connected circuits such as the Solomon R Guggenheim Foundation, located in New York City. The authors of this paper posit to envision a method for visually depicting the connection between the GMB and the Guggenheim New York.

In brief, the Guggenheim Museum was a single structure that was able to shift global perceptions of the city of Bilbao and alter its media exposure[1] (Plaza and Haarich 2009; Plaza et al. 2015; Uluğ 2020). In this vein, Sydney had demonstrated the value of its transformative landmark, the Sydney Opera House, as had Paris with the Eiffel Tower and the Pompidou Centre, Barcelona with Antoni Gaudi's Sagrada Familia, India with the Taj Mahal, Moscow with St Basil's Cathedral, or more recently Hamburg with the Elbphilharmonie.

The network analysis demonstrates that the GMB achieved a central place in the New York Times media matrix in the first period, and has pretty much sustained this position twenty years later. Understanding and quantifying how art museums become more effective, by gaining better placement in the worldwide media matrix, positions policy makers to not only estimate how many public resources are worth investing to acquire said placement but also implement similar strategies in other places.

The structure of the paper is as follows. Section 2 presents the literature review, the economics of superstar architecture-led positioning in global media. In Section 3, the main contribution of this paper – the methodology and results – is presented. In Section 4, the limitations and future studies are addressed. Finally, Section 5 is devoted to conclusions.

2. Literature review: the economics of superstar architecture-led repositioning in global media

In the field of cultural economics, very few scholars have studied superstar architecture from the quantitative lens.[2] Patterson (2021) examines the effect of 'Iconic Architectural Developments' on neighbourhood-level economic and cultural changes in Canada and the U.S.A. during the period 2000–2009. His analysis demonstrates that neighbourhoods

with 'Iconic Architectural Developments' generally experienced more economic and cultural growth.

Plaza et al. (2015) measure statistical causality between global media exposure of the GMB in conventional media (e.g. Google News) and the number of visitors to Bilbao. They employed the structural time series model (STSM) for this exercise. Results show that (1) an increase in the number of articles about the Guggenheim Museum Bilbao published in Google News leads to an immediate increase in the number of domestic visitors to Bilbao, accompanied by a further 4-quarter lagged increase; (2) the number of foreign visitors to Bilbao is influenced by the visibility of the GMB in newspapers and magazines three months ago. In other words, the number of Spanish visitors to Bilbao increases at the same time and one year after the news publication on the GMB occurs; whereas the number of foreign visitors increases one quarter after the news publication on the GMB occurs (Table 1, page 189). Note that the pattern of lags between media exposure and number of visitors is different for Spanish visitors and foreign visitors.

From a Data Science viewpoint, as a valuable preliminary approach, Plaza and Haarich (2006), Alaily-Mattar et al. (2018), Alaily-Mattar, Büren, and Thierstein (2019), Jacquot and Chareyron (2020), and Lindsay and Sawyer (2021) had conducted data extraction, cleaning and pattern recognition from items in online newspapers and periodicals (e.g. New York Times, Lexis Nexis, Avery), websites with user-generated content (e.g. Tripadvisor), and photo-community platforms (e.g. Flickr and Instagram) in which superstar architecture is tagged.

The Guggenheim Museum Bilbao is probably one of the most repeated narratives with regard to the role of superstar architecture in the alteration of the global perception of the city-region in which the museum is located. The overall conception of Bilbao in the global media has been influenced profoundly by the Guggenheim Museum Bilbao (Plaza and Haarich 2006; Plaza et al. 2015; Alaily-Mattar, Büren, and Thierstein 2019; Jacquot and Chareyron 2020). To demonstrate the correlation between the impact of a superstar museum on the perception of the city-region in the global media, Plaza and Haarich (2009) used the presence of Bilbao in the New York Times as a proxy for the presence of Bilbao in the international press. A count of the news items published by the New York Times was carried out from the years 1987 to 2007 (ten years prior to and post the opening of the GMB). The exercise revealed that the mention of Bilbao (and the Basque Country in general) had been almost negligible in the New York Times, before the opening of the GMB. To put this differently, the GMB had given the city a visibility on the global stage – in the same time and at the same pace in which it became more attractive for international visitors (Plaza and Haarich 2006). Alaily-Mattar, Büren, and Thierstein (2019) found that the GMB underwent a pronounced and sustained quantitative increase in mentions in the New York Times from its inauguration in 1997 to 2017, 20 years later (Alaily-Mattar, Büren, and Thierstein 2019, Figure 3).

In addition to this, in their Flickr analysis, Alaily-Mattar, Büren, and Thierstein (2019) showed that 17% of all the images of the city of Bilbao were tagged GMB (Alaily-Mattar, Büren, and Thierstein 2019, Figure 4). In line with this, Jacquot and Chareyron (2020) performed a lexical analysis of Tripadvisor for Bilbao and the Guggenheim Museum for the year 2018. Their results showed that 36.3% of the English comments on Tripadvisor in connection to the GMB directly addressed its architectural structure and effects,

whereas almost 72.97% of the comments in French, focused on its architectural structure (Jacquot and Chareyron 2020, Table 9.1).

Another approach was by Aranburu, Plaza, and Esteban (2020), in which they identified central urban tourism attractions from a combination of GPS tracking data, 'network analysis' of the tourism attractions derived from the GPS data, and a lexical analysis of 'Tripadvisor' for the city of Bilbao. Their methodology led to expected results. Social media content (e.g. TripAdvisor) and experts (tourism agents) pointed to the Guggenheim as the main tourism asset, and the Old Town area of Bilbao as the most visited spot in Bilbao. Media exposure of a superstar architecture thereby not only has a substantial impact on the number of visitors and the local economy but equally elevates the attraction of other local tourist spots of the city.

Yet, an evident shortcoming is the mapping of media positioning. The aim of this article is precisely to draw and visualize this positioning of the Guggenheim Museum Bilbao through networks, around its inauguration in the year 1997 and twenty years later. Although media positioning is a multilayer network phenomena, with overlapping media networks on diverse topics connected to the superstar museum (e.g. iconic pictures, art celebrities, global sponsors, superstar architects), we focus on one concrete network for the sake of simplicity: the positioning of top museums in the New York Times.

A question that needs to be asked is, 'what facilitates an increase in media visibility for an iconic architectural museum and helps sustain it, on the global sphere?' The concept of 'information goods' is key to answering this. Shapiro, Carl, and Varian (1998), who defined 'information goods' as anything that can be digitized: books, newspapers, magazines, music, photographs, movies, videogames, software and even a smartphone chat. Their seminal book, written in 1998, set up the basis for the branch of economics relating to information goods, its rules and its connections with 'Network Economics'. Moreover, it is precisely within this framework, we endeavour to develop the theoretical economic background of alteration of the perception of a museum and the city-region, powered by media visibility of the superstar museum. We will explore the concept of 'information goods' as a means to understand this correlation in the following four ways:

First, in the digital world, information goods can be disseminated at a massive rate, facilitated by the cost structure of their supply, since the marginal cost of reproducing any information good is practically zero (Shapiro, Carl, and Varian 1999). Even though the initial cost of producing a piece of art might be high, once it is digitalized, it is easy and cheap to replicate. Similarly, once a singular superstar museum is built, the marginal cost of reproducing its unique image is nearly zero, largely due to the reach of the digital media (Aksoy and Robins 1992; Plaza et al. 2015).

Second, a 'celebrity status' is not a sufficient condition to ensure the uniqueness and lure of an architect's design. Many notable artists have been known to produce inconsistent pieces of art (Plaza 2006): 'Architecture, like all true works of art, is judged for itself, irrespective of its author, the material used, the kind of forms used, or its position (initial, middle or late) in the author's body of work (…). Every artist knows very well that some of his/her works are better than others, and that success, in artistic terms, is no sure thing even for the author, who is the first to be surprised (thus Picasso's much repeated words: 'I do not seek, I find') (…). Works of art, then, an artist's best creations, are unique' (Frias 1995, 3). Creativity is therefore a highly elusive reality, and this is similar in the case of

architects as well. We underscore that strategies based solely on 'uniqueness' or 'distinction' of a design are highly risky to depend on, for fulfilling projected public goals of the museum. Fortunately, for the city of Bilbao, Frank Gehry's design turned out to be one of the masterpieces of twentieth-century architecture, but it must not be forgotten that it could as easily have failed.

Third, consumption of singular art information goods is highly addictive and to the extent that it is consumed, it reinforces the addiction: The more you taste it, the more you like it and the more you like it, the more you want it. Stigler and Becker (1977) pointed out that the utility derived from the consumption of art depends on the quantity of the art consumed. Similarly, the ability to appreciate art is a function of the past consumption of art. In other words, the availability and subsequent consumption of information goods (images, news items) of unique architectural designs, increases the addiction to the goods, which in turn leads to an increase in the accumulation of architectural information goods (Plaza et al. 2015).

Fourth, nothing is more crucial to the study of superstar architecture (culture) than the notion of semiotics (the field that studies the interpretation of meanings and symbols), yet nothing is harder to dissect (DiMaggio 2011). The research study by sociologist Paul DiMaggio (1997) on art-related cognitive psychology and social cognition is one of the linchpins to gain a full understanding of superstar architecture and its impact on repositioning cities in the global media (e.g. Sydney, Bilbao). The reasons for it are the following: (1) cultural facilities can generate meanings, symbolic connections and mental associations (DiMaggio 1997) in people's minds when they see it. In fact, part of building an effective digital media strategy for a cultural asset, involves, understanding what drives these cognitive connections in people's minds. (2) These cultural-cognitive information goods tend to be schematic, easily digested by simplified thinking (DiMaggio 1997). This means that unique architectural landmarks with high visibility on the Internet can help people to remember places more easily, placing their respective city-regions on the world map (Eiffel Tower in Paris, Sydney Opera House, etc.). (3) As a result of this, architectural landmarks can play a vital role as network connectors, to the extent that they create networks of meaning (Bourdieu 1984; DiMaggio 2011) in the global media. The Sydney Opera House shifted the global perceptions of the city of Sydney, as did the GMB with Bilbao, or the Louvre for Abu Dhabi.

3. Mapping the positioning of the Guggenheim Museum Bilbao through networks: methodology and data extraction

The objective of this article is to visualize the positioning of the GMB in the global media, both in the period of its inauguration in 1997 and again 20 years later. We use the New York Times (NYT) as a proxy for the global media as stated previously.

Through this exercise, this paper attempts to develop a better understanding of how Superstar Museums that are built in a second/third-tier city can attain global visibility by centrally positioning itself in the global media circuit and furthermore, how this visibility in press actually impacts and elevates the city region (Plaza et al. 2015).

Before moving on, we want to expand on the rationale for using the NYT for our preliminary approach: (1) the art market is a duopoly formed by London and New York (Goetzmann 1993), and the New York Times is a clear exponent of the specialized

press in the world art market. (2) According to the 'Big Data' analysis by the Gottlieb Duttweiler Institute (2016), the New York Times is one of the most influential newspapers in the English-speaking global conventional media. Moreover, in the case of global museums, English is the 'lingua franca' of the global economy. (3) The headquarters of the Solomon R. Guggenheim Museum are located at Manhattan, New York City. (4) The New York Times is an authoritative voice that spends enormous resources on covering the entire world. Moreover, the stories/articles published in the NYT, whether they relate to the unveiling of new art structures or facilities, or to human interest stories on artists around the globe, they pre-empt similar stories by other publications and media outlets by a wide margin. (5) The New York Times has an article search API which allows the search and extraction of articles data, making it a convenient tool for our study.

To this extent, the prospective positive selection bias of the NYT (as a result of the institutional linkages between the two museums) and the reality of the NYT being the top exponent of the world art market together contribute to helping the GMB gain a better placement in the global media network, thereby bolstering our very hypothesis. Thus the use of the New York Times as a frame of reference is still of consequence in statistical terms, and can be employed as a preliminary approach to explore this hypothesis.

The visualization of the positioning of the GMB in the NYT is accomplished through networks. Nodes represent Superstar Museums, whereas links signify co-citations within news articles. In other words, a co-citation occurs when both the museums are cited simultaneously within the same news item.

Data extraction is performed for two 6-year periods, 1995–2000 and 2014–2019, which correspond to the inauguration of the GMB in 1997 and 20 years later, respectively.

We explore centrality by using the concept of eigenvectors. The basic idea is that the influence of a node depends on its number of direct connections with other influential nodes, and the grade of influence of these nodes, themselves. In other words, a museum is influential in the NYT to the extent it is directly connected to influential museums.

The Eigenvector formula is as follows (Bonacich 1987; Borgatti, Everett, and Johnson 2018):

$$x_v = \frac{1}{\lambda} \sum_{t \in M(v)} x_t = \frac{1}{\lambda} \sum_{t \in G} a_{v,t} x_t$$

where $M(v)$ is the set of neighbours of node v, λ is a constant and $A = (a_{v,\,t})$ is the adjacent matrix. The Eigenvector is proportional to the sum of the centralities of the neighbours.

For the selection of nodes, we use the list in Table 1 of the most-visited art museums in the world in the year 2019, as announced by The Art Newspaper (2020).

The co-citation network data is extracted from the NYT article search API by means of a script, in order to automate the data gathering process. The networks of co-citations are weighted and not directed. UCINET software has been used for network graphing (Borgatti, Everett, and Johnson 2018) and SPSS for calculations.

The networks of co-citations in the New York Times for the 6 years 1995–2000 and the 6 years 2014–2019 are as follows (Figures 1 and 2).

**Table 1.** Top 100 Art Museum Attendances (2019).

	Art Museums	Visitors		Art Museums	Visitors
1	Musée du Louvre PARIS	9,600,000	51	Art Gallery of New South Wales SYDNEY	1,289,195
2	National Museum of China BEIJING	7,390,000	52	Guggenheim Museum NEW YORK	1,283,209
3	Vatican Museums VATICAN CITY	6,882,931	53	Museum of Fine Arts BOSTON	1,261,623
4	Metropolitan Museum NEW YORK	6,479,548	54	Royal Castle WARSAW	1,256,920
5	British Museum LONDON	6,239,983	55	Gyeongju National Museum GYEONGJU	1,251,196
6	Tate Modern LONDON	6,098,340	56	Royal Academy of Arts LONDON	1,248,882
7	National Gallery LONDON	6,011,007	57	Museum of Fine Arts HOUSTON	1,248,624
8	State Hermitage ST PETERSBURG	4,956,529	58	Mucem MARSEILLES	1,207,663
9	Reina Sofía MADRID	4,425,699	59	National Museum in Krakow KRAKOW	1,196,207
10	National Gallery of Art WASHINGTON	4,074,403	60	Montreal Museum of Fine Arts MONTREAL	1,174,890
11	Victoria and Albert Museum LONDON	3,932,738	61	Guggenheim BILBAO	1,170,669
12	National Palace Museum TAIPEI	3,832,373	62	Saatchi Gallery LONDON	1,160,729
13	Musée d'Orsay PARIS	3,651,616	63	Museo Soumaya MEXICO CITY	1,115,922
14	Museo Nacional del Prado MADRID	3,497,345	64	Musée du Quai Branly PARIS	1,112,423
15	National Museum of Korea SEOUL	3,354,161	65	Musées Royaux des Beaux-Arts BRUSSELS	1,091,280
16	Centre Pompidou PARIS	3,273,867	66	Galeries Nationales du Grand Palais PARIS	1,075,187
17	Moscow Kremlin Museums MOSCOW	3,101,550	67	Museu de Serralves PORTO	1,074,200
18	Tokyo Metropolitan Art Museum TOKYO	2,873,806	68	Imperial War Museum LONDON	1,073,936
19	Somerset House LONDON	2,841,772	69	Museu Picasso BARCELONA	1,072,887
20	State Tretyakov Gallery MOSCOW	2,835,836	70	de Young Museum SAN FRANCISCO	1,070,157
21	Rijksmuseum AMSTERDAM	2,700,000	71	Fondation Louis Vuitton PARIS	1,065,000
22	Tokyo National Museum TOKYO	2,684,754	72	Museu Coleção Berardo LISBON	1,060,644
23	Centro Cultural Banco do Brasil RIO DE JANEIRO	2,606,999	73	Museo Thyssen-Bornemisza MADRID	1,034,939
24	NGV International MELBOURNE	2,432,883	74	Whitney Museum NEW YORK	1,030,945
25	State Russian Museum ST PETERSBURG	2,394,400	75	Musée de l'Orangerie PARIS	1,029,925
26	Galleria degli Uffizi FLORENCE	2,361,732	76	MCA Australia SYDNEY	1,014,021
27	National Folk Museum of Korea SEOUL	2,286,276	77	Albertina VIENNA	1,001,294
28	National Museum of Scotland EDINBURGH	2,210,024	78	Louvre Abu Dhabi ABU DHABI	975,483
29	Van Gogh Museum AMSTERDAM	2,100,000	79	Lacma LOS ANGELES	968,161
30	Shanghai Museum SHANGHAI	2,070,270	80	American Indian Museum WASHINGTON	960,933
31	Museum of Modern Art NEW YORK	1,992,121	81	Museum of Liverpool LIVERPOOL	956,918
32	National Art Center Tokyo TOKYO	1,921,526	82	Petit Palais PARIS	950,288
33	Kunsthistorisches Museum VIENNA	1,839,027	83	SFMoMA SAN FRANCISCO	950,000
34	Kelvingrove Art Gallery & Museum GLASGOW	1,832,097	84	Garage Museum MOSCOW	942,159
35	National Gallery SINGAPORE	1,817,335	85	Ashmolean Museum OXFORD	927,043
36	Tate Britain LONDON	1,808,637	86	Art Gallery of Ontario TORONTO	922,014
37	Acropolis Museum ATHENS	1,760,315	87	Israel Museum JERUSALEM	920,744
38	Österreichische Galerie Belvedere VIENNA	1,721,399	88	The Broad LOS ANGELES	917,489
39	Galleria dell'Accademia di Firenze FLORENCE	1,704,776	89	Hirshhorn Museum WASHINGTON	891,114
40	National Portrait Gallery/SAAM WASHINGTON	1,700,000	90	Dallas Museum of Art DALLAS	884,967
41	Art Institute of Chicago CHICAGO	1,665,516	91	MUAC UNAM MEXICO CITY	883,636
42	National Portrait Gallery LONDON	1,634,934	92	National Gallery of Australia CANBERRA	867,088
43	National Museum of Western Art TOKYO	1,587,363	93	Museo Egizio TURIN	853,320
44	Scottish National Gallery EDINBURGH	1,583,231	94	MNAC BARCELONA	837,694
45	Centro Cultural Banco Brasil BELO HORIZONTE	1,519,033	95	Reggia di Venaria Reale VENARIA	837,093
46	Pushkin Museum MOSCOW	1,481,300	96	Huntington Library SAN MARINO	828,503
47	Getty Center LOS ANGELES	1,439,084	97	Neues Museum BERLIN	827,989
48	MMCA SEOUL	1,420,161	98		827,588

(Continued)

Table 1. Continued.

|	Art Museums	Visitors		Art Museums	Visitors
				Centro Cultural Banco do Brasil SÃO PAULO	
49	Tel Aviv Museum of Art TEL AVIV	1,322,439	99	Teatre-Museu Dalí FIGUERES	819,542
50	Royal Ontario Museum TORONTO	1,309,345	100	Pergamonmuseum BERLIN	804,113

Source: The Art Newspaper No. 322, April 2020.
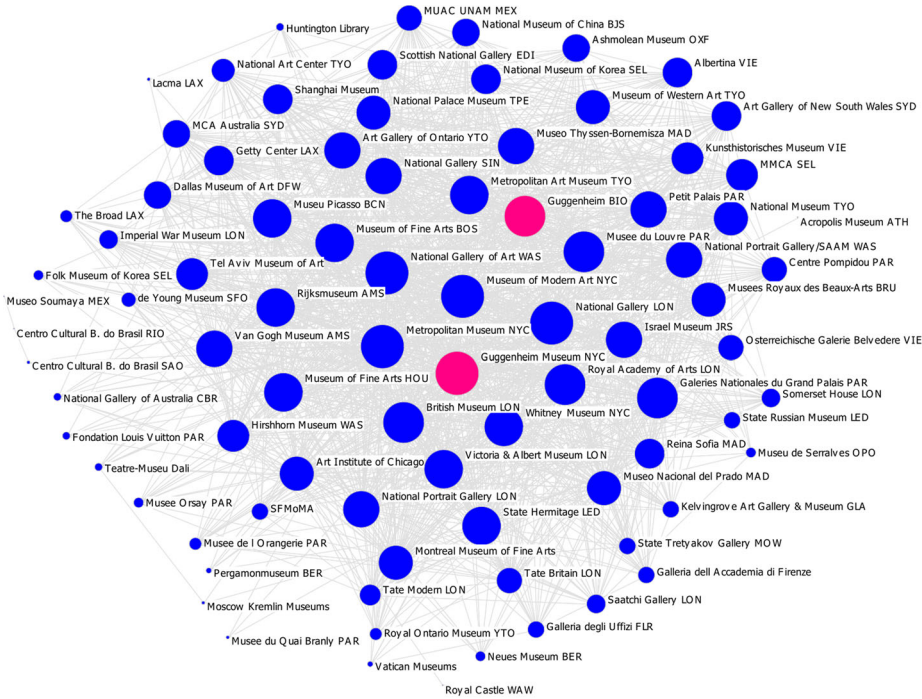
Figure 1. Co-citations Network of Superstar Museums in the New York Times (1995–2000 6-year term). Source: Own elaboration, data gathered from NYT API. Note: The size of the circles indicates eigenvector and the position of the circles indicates network centrality (as determined by the position of the co-cited nodes).

First, for the Eigenvector to be a valid measurement, the first Eigen Value must be at least twice that of the second (Borgatti, Everett, and Johnson 2018, 169). In our case, this condition is fulfilled. In the 1995–2000 period, the Eigen Value of Factor 1 is 1484, whereas the Eigen Value of Factor 2 is 278. In the 2014–2019 period, the Eigen Value of Factor 1 is 1516, whereas the Eigen Value of Factor 2 is 130. The validity of this form of measure holds true. Therefore, we can use eigenvectors to understand the level of popularity in the NYT, in the sense that a museum with high eigenvector centrality value is connected to museums that are themselves well connected.

Second, for the context of this paper, we are drawing an analogy between a star network and our NYT networks when it comes to coverage on museums. Sherwin Rosen in his 'The Economics of Superstar' (1981), stated that the superstar museum markets are characterized by large unequal media exposure. That is, media exposure is
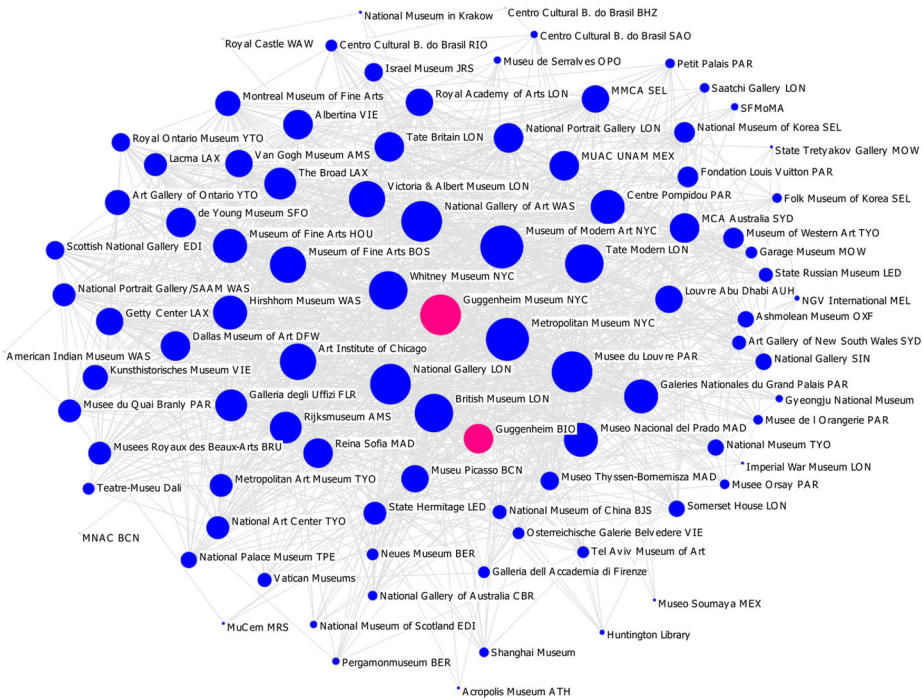
Figure 2. Co-citations Network of Superstar Museums in the New York Times (2014–2019 6-year term). Source: Own elaboration, data gathered from NYT API. Note: The size of the circles indicates eigenvector and the position of the circles indicates network centrality (as determined by the position of the co-cited nodes).

concentrated among a handful of museums. These handful of museums would therefore occupy the central position in the global media network. Thus the British museum, Museum of Modern Art, Guggenheim New York and Louvre are the most prominent museums. If other museums congregate around them, and cooperate with these authority museums, they will be closer to the centre of the network, boosting their visibility in the media, attracting more attention and audience to their facility.

The star network is the most centralized or most unequal possible network for any number of nodes. In the language of networks, the Freeman Network Centrality Index measures how unequal the nodes are by comparing the network with a star network. In other words, the Freeman Network Centrality Index expresses the degree of inequality or variance in our network as a percentage of a perfect star network of the same size. In the 1995–2000 network, the Freeman Network Centrality Index is 72.5, whereas in the 2014–2019 network the index is 75.2. This means that these networks have respectively a 72% and 75% similarity to a same size 'star network'. In other words, co-citations are unevenly distributed and are concentrated in a handful of museums.

Third, how well does the GMB fare with regard to positioning? Figure 3 summarizes the positioning for both periods, 1995–2000 and 2014–2019. To visualize positioning, Z-Scores of the eigenvectors for both periods are plotted (Figure 3). Z-Score is measured in terms of standard deviations from the mean. If a Z-Score is 0, it indicates that the data
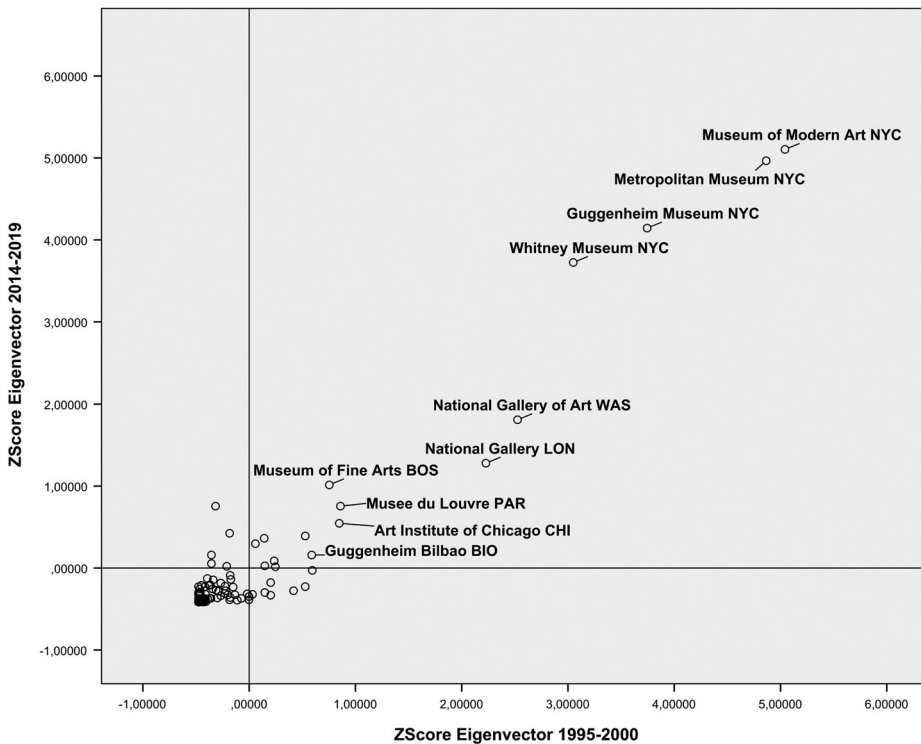
Figure 3. Positioning of Top Museums in the New York Times: Benchmarking 1995–2000 with 2014–2019. Source: Own elaboration.

point's score is identical to the mean score. Positive Z-Scores are above average. Negative Z-Scores are below average.

The top leading museums are the Museum of Modern Art NY, the Metropolitan Museum NY, the Guggenheim Museum NY, the Whitney Museum NY, the National Gallery of Art WA and the National Gallery LDN for both time-periods. They rank far above the other museums (Figure 3). Note that (1) attention from the New York Times concentrates fundamentally on the Top museums from the city of New York; (2) the Guggenheim Museum NY ranks third in both periods and (3) changes in the positioning are minimal and not significant from 1995–2000 to 2014–2019.

Fourth, the GMB maintains positive Z-Scores in both periods (Figure 3). In other words, the GMB eigenvector centrality performs above average in both periods, with noteworthy centrality around its inauguration in 1997 and again twenty years later. In addition to this, the GMB is well connected to the top leading museums, and especially well connected to the Guggenheim Museum NY. Or, in other words, the GMB is cited in news items simultaneously with top leading museums with a notable eigenvector. Nevertheless, twenty years on, the GMB has lost a substantial amount of co-citations with the Solomon Guggenheim Museum NY, but the Z-Score is still above average, meaning it is still well connected.

The Pearson Correlation Coefficient between the Eigenvector Centrality of the museums and the number of co-citations of the GMB with each museum is high, positive and significant for both periods. Even more, the correlation coefficient increases slightly

from the first period ($r = 0.72$, $n = 100$, $p < 0.01$), to the second period ($r = 0.81$, $n = 100$, $p < 0.01$). The take away message of this is that the GMB is being co-cited with the most prominent top global museums in the NYT, for both periods.

The higher the eigenvector value, the more number of times it is mentioned in the NYT and hence, the more well-connected the museum is, as a result.

4. Limitations and future work

In this part, we will be discussing the potential limitations of this study and the subsequent scope of future research.

First, we will analyse the obvious question that pertains to the selection bias of the source. It is not surprising, that articles in the New York Times mention quite often museums from New York or the U.S.A., and that they refer consequently to the links between the Guggenheim in NY and in Bilbao.

Here is a representation of the magnitude of the selection bias. In Berlin, the Deutsche Guggenheim opened in November 1997, only one month after the opening of the Guggenheim Museum Bilbao. We weigh up/juxtapose the number of articles that cite or refer to Deutsche Guggenheim with the number of articles that cite or refer to the Guggenheim Bilbao in the New York Times for two different time-periods (Table 2).

The visibility of the Guggenheim Museum Bilbao in the New York Times is notably higher. There is a prospective positive case to be made for the selection bias of the source. But at the same time, there is a gulf between the number of articles cited about the Deutsche Guggenheim with the articles cited about the GMB, even though both have institutional linkages with the same Foundation. The magnitude of the selection bias isn't that big to have any impact or to disprove the result of the research. (According to the Big Data analysis by the Gottlieb Duttweiler Institute (2016), the New York Times is one of the most influential newspapers in the English-speaking global conventional media along with 'The Guardian').

Second, to explain the disjunction/chasm between GMB's media positioning and relative lower position in terms of attendance (Table 1), we need to bring in a new variable already discussed above: the city size and the hierarchy of cities. It is important to understand that second/third-tier cities in the world hierarchy have much lower number of visitors irrespective of their positioning in the international media. They inevitably attract a smaller number of visitors regardless their numerous urban attractions (old towns, iconic buildings, excellent gastronomy, famous plazas, grand parks, shopping areas, etc.). Bilbao, as stated, is a medium size second/third-tier city and ergo attracts fewer visitors as a result.

Irrespective of the mismatch, it is an accomplishment of no mean feat that the GMB has held, since its opening, a position in the top 100 most visited museums in the world, in spite of being in a second/third-tier industrial town.

Table 2. Number of articles in the New York Times: The Deutsche Guggenheim in Berlin vs. the Guggenheim Museum Bilbao.

Time Period	Deutsche Guggenheim	Guggenheim Museum Bilbao
1995–2000	55	228
2001–2010	81	429

Source: New York Times.

Table 3. Number of Visitors to the Guggenheim Museum Bilbao (1997–2019, annual data).

Year	N. visitors
1997 Oct–Dec	259,234
1998	1,307,065
1999	1,109,495
2000	948,875
2001	930,000
2002	851,628
2003	869,022
2004	909,144
2005	965,082
2006	1,008,774
2007	1,002,963
2008	951,369
2009	905,048
2010	956,417
2011	962,358
2012	1,014,104
2013	931,015
2014	1,011,363
2015	1,103,211
2016	1,169,404
2017	1,322,611
2018	1,265,756
2019	1,170,669

Source: Guggenheim Museum Bilbao.

Third, in the network analysis, we don't authoritatively know the drivers behind the co-citations. The co-citations may have an origin in the linkages between major metropolitan cities (in which the respective museums are located) or the fact that it was designed by the same architect, or the reality of common artists, connections through rotatory exhibitions, the same curators or even the museums having a similar impact in regeneration the local economy and city-region. This will also be further established in the future research that we will undertake with 'The Guardian' and 'El Pais' as the main frames of reference.

5. Conclusion

Superstar architecture can play a key role in the global positioning of museums in influential mass media, thereby successfully attracting cultural tourism. The Guggenheim Museum Bilbao, in spite of being in a medium size second/third-tier city, has managed to link itself with well-connected media networks; thereby positioning itself strongly in the global media sphere. This has led to a positive impact on the cultural tourism to the city (Table 3). Yet, an evident shortcoming is the mapping of media positioning. The aim of this article was to draw and visualize this positioning through networks. As a novel approach to this, we built as a proxy, a co-citation network from the New York Times for top Superstar Museums. Within the top museums, we tested for the positioning of the GMB for two periods, corresponding first to its inauguration in 1997 and then 20 years later. The network analysis demonstrates that the GMB was well cited and co-cited in the first period and has sustained this position twenty years later. This has ensured that the GMB has continued to attract visitors, which has in turn led to a continuing socio-economic regenerative process for the local economy of Bilbao.

In the first evaluation undertaken by Thomas Krens, director of the Guggenheim Foundation New York in 1997, the principal motive that inspired tourists to visit Bilbao was the magnetism of Frank Gehry`s building itself (Krens 1999). Yet, for the phenomena of Superstar Museums to exist, media attention is of critical importance. Although we do not address causality in this study, the connection to New York seems to be key for the GMB and its positioning in the New York Times. The question is: Would Bilbao have positioned itself in global media if not for its connection to the Solomon Guggenheim Museum in New York, inspite of Krens' evaluation?

Furthermore, new rising Superstar Museums appear in the 2014–2019 network, such as the Louvre Abu Dhabi museum, Fondation Louis Vuitton in Paris, the Garage Museum in Moscow, the Neues Museum in Berlin or the American Indian Museum in Washington, to mention a few (Figure 2). We should raise a pertinent question as to whether these up and coming Superstar Museums will compete with the GMB, causing a decrease in the GMB`s media visibility and, thereby, diminishing its number of visitors. Yet, at least for now, the number of total visitors to the GMB has shown a sustained increase and remained largely stable up until the Covid-19 crisis in 2020 (Table 3).

The agenda for future research calls for a repetition of this experiment with Google News to pinpoint more accurately the positioning of the Guggenheim Museum Bilbao in the global conventional media. Future studies may also enable us to determine its evolution in social media (e.g. Tripadvisor, Instagram, Flickr) and to shed light on the causality between exposure on social media platforms and audience size.

Notes

1. To attribute the transformation of the city of Bilbao to a single building (namely the Guggenheim Museum by Frank Gehry) is a little naive. The urban regeneration of Bilbao is a complex and multidimensional process that has converged in a series of strategies that go beyond the 'Guggenheim effect'. Bilbao tackled its socio-economic problems through a holistic plan, by implementing a large, coherent public policy targeted at productivity and diversity, with a strong cultural component. Regional public authorities moved towards policies aimed at creating competitive environments with very strong elements of innovation, technology, internationalization, education, training and entrepreneurship (Heidenreich and Plaza 2015).
2. Alaily-Mattar, Dreher, and Thierstein (2018) develop a holistic approach to superstar architecture-led positioning of cities, by constructing a conceptual impact model. Here, in this article, we narrow the focus to positioning Superstar Museums in global media. For an updated literature review on star architecture, see Alaily-Mattar, Hall, and Thierstein (2021). For the Economics of Museums, see Throsby (1994), Ginsburgh and Throsby (2006) and Fernandez-Blanco and Prieto-Rodríguez (2020).

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