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ORIGINAL ARTICLE

Comparing city image and brand identity in polycentric regions using network analysis

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Abstract
In a globalising world, cities find themselves competing for visitors, residents, investors, and companies. They use place branding strategies to become more visible. However, conceptual and analytical confusion exists on the subjects of place image and brand identity, and current studies are limited to single cities, neglecting inter-city relationships at the regional level. In this paper, we examine how place image and brand identity of cities in polycentric regions can be compared with each other. Inspired by Zenker and Beckmann's network analysis approach for studying place branding (J Place Manag Dev 6(1): 6–17, 2013), a method is introduced to compare image and identity networks for polycentric regions. We use this to complement traditional steps of concept mapping (i.e. elicitation, mapping, and aggregation), and apply it to analyse the illustrative case of four cities in the MRDH region within the Netherlands. Results of the comparative analysis between the image network and the identity network provide both visual and quantitative insights revealing structural differences. The network analysis research approach can be useful to both policy-makers and researchers in analysing city image and brand identity, and to develop place branding strategies accordingly, even at the regional level.

Keywords City branding · Polycentric regions · Brand identity · Place image · Network analysis

Introduction

Cities play an increasingly important role in modern society. As centres of social and economic development, they account for a large share of the global population, energy consumption, and carbon emissions, despite covering only a small surface on the earth (United Nations n.d.). Currently, cities make up for just over half of the world's total population. However, this is set to increase to two-thirds by 2030 (UN-Habitat 2016). These places provide us with opportunities to live, work, visit, and do business. In a globalising world, cross-border movement of people and business takes place on an enormous scale. Therefore, cities find themselves competing for the likes of visitors, residents, investors, and companies. This is addressed in the domain of 'place branding', a long-term strategic activity (Baker 2012; Hankinson 2010) aimed at the positioning of cities, regions, and countries amidst their neighbours and peers, which is closely connected to the concept of 'place brand'. The latter can be defined as "a network of associations in the place consumers' mind based on the visual, verbal, and behavioural expression of a place and its' stakeholders. These associations differ in their influence within the network and in importance for the place consumers' attitude and behaviour." (Zenker and Braun 2017, p. 275). In relation to place brand 'place branding' can be seen as a strategic activity with places trying to garner positive associations in the place consumer's mind (*Ibid.*).

The relationships cities have with their neighbours and peers is one of competition and cooperation at the same time. They vie partly for the same resources, but may also

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attempt to ignite synergies at the regional level generating benefits for all cities in the region. This mixed phenomenon is particularly strong in polycentric regions, where not one city dominates others but a number of cities of roughly equivalent size co-exist and interdepend. This is an increasingly common form of urbanisation, especially in advanced economies (Kloosterman and Musterd 2001), in which place branding as a strategic activity is gaining more attention.

Place branding as a topic originates from the domains of marketing and tourism, whereas the term 'polycentric region' emerged in urban studies. It is therefore not surprising that these two concepts are not combined on a regular basis. However, place branding and polycentric development are strongly interlinked, especially when it comes to governance approaches. This is the case since place branding is in fact both a strategy and a communicative policy instrument to achieve long-term policy goals (Joo and Seo 2017) in a polycentric geographic context where positioning choices of cities and their quest for uniqueness and complementarity directly affect those of their neighbours and peers (Boisen 2015). In polycentric regions, coordination efforts and effective regional governance are crucial (ESPON 2005) and have a positive effect on the performance of the region (Meijers et al. 2017). Branding is one of the topics on which cities can collaborate. However, only a few studies have analysed city branding practices in polycentric regions thus far (see for example De Jong et al. 2018; Goess et al. 2016; or Ren and Berg 2014).

Two important recurring themes in the place branding literature are brand identity and brand image. Image is the people's perception or impression of a place (Anholt 2007; Boisen et al. 2017; Kavaratzis et al. 2015; Vanolo 2008). It is believed to be one of the main drivers for people when they choose a place for tourist, residential, or business purposes. Keller (1993) defines brand image as perceptions about a brand as reflected by the brand associations held in customer memory. Zenker and Braun (2010) transferred this definition to brands as a network of (perceived) associations to place brands, which led them to conceptualise image association networks. In turn, this allowed for measurement of 'perception of city' networks by certain target groups, later deployed in a study by Zenker and Beckmann (2013a, b) who used network analysis to analyse these.

Literature on place brands presents a wide range of methods to measure place image, from semantic-differential scales (Baxter and Kerr 2010) to visual collages and drawings, and networks (Laaksonen et al. 2006). Next to benefits these methods offer, they also have limitations. For example, according to Ci and Choi (2017) image studies lack the incorporation of brand identity, which is the image as desired by place brand managers (Boisen et al. 2011; Hanna and Rowley 2013; Pike 2007).

Brand identity as a concept originates from companies that have the responsibility to create differentiated products with unique features (Nandan 2005) that offer sustainable competitive advantages (Ghodeswar 2008). In the realm of cities brand identity would mean: an identity of a city which differentiates itself from others having unique features (that attract tourists, residents, business corporations, and the like) as developed and desired by city officials, based on a thorough understanding of the city's residents and clients, competitors, and business environment. Although brand identity is often treated as a static phenomenon in the literature, Kavaratzis and Hatch (2013) argue that place identity should be thought of as a complex process of identity construction rather than a specific outcome of such a process. They view place identity rather as a (deliberative) process of dialogue between stakeholders, and argue that place branding should be seen in a similar way.

Measuring both brand image and brand identity allows for a comparison between the two and provides vital information as to whether the perception outsiders have of a city (brand image) is aligned with how policy-makers desire it to be (brand identity). Better conceptual and empirical understanding of the relationship between place identity and place brands is needed to advance theoretical elaboration of place branding (Kavaratzis and Hatch 2013). In short, in this contribution, we identify the link between place image and brand identity of cities in a polycentric context as the central knowledge gap and aim to compare them, i.e. how can place image and brand identity of cities in polycentric regions be compared?

Theoretical underpinnings of brand image and brand identity of cities in polycentric regions

Polycentric regions

Polycentricity connotes a plurality of centres (Parr 2004) that are, from a governance point of view, formally independent from each other (Ostrom et al. 1961). Polycentric regions refer to the spatial application of polycentricity, with cities functioning as the centres. Generally, polycentric regions are defined as "clusters of historically and administratively distinct but proximate and well-connected cities" (Meijers et al. 2017, p. 2). Polycentric regions are characterised by competition and cooperation. Competition between cities may induce specialisation and complementarity (Cuadrado-Roura and Rubalcaba-Bermejo 1998 as referred to in Goess et al. 2016, p. 2039), whereas cooperation between cities strengthens the functional character of the region as a whole (Goess et al. 2016).

Meijers et al. (2012) mention three approaches to polycentric development in the research domain: as a normative planning strategy, as a spatial process, and as a spatial outcome of this process. Polycentricity can thus be prescriptive as a form of desirable spatial development, descriptive about the process to realise it, or descriptive about the spatial configuration that arises as a result. In the present study, the latter approach is applied.

A way of looking at polycentric regions is the degree of integration. Meijers et al. (2012) distinguish between functional, institutional, and cultural integration. Functional (or spatial) integration is driven by specialisation and good infrastructural and transport systems. Institutional integration concerns the presence of regional governance and supporting administrative bodies. Cultural integration requires regional identification and involvement of relevant stakeholders, such as politicians and residents. This latter type of integration is especially relevant for the place branding perspective here. The authors stress that these three dimensions are tightly linked and leverage each other, like an upward spiral. In this way, the polycentric region is able to function as one large city network. The process of improving the three dimensions of integration is referred to as metropolisation.

Place branding

Place branding, of which city branding is a subset, as a research field has gained more and more traction over the last two decades, paralleled by an increasing amount of place branding practices and services. However, it should not be confused with the promotion or marketing of places, as convincingly argued by Boisen et al. (2017) who state that place promotion is only about generating attention for a place and does not require interventions in the physical space. They rather consider it 'supply-driven'. On the other hand, place marketing is more concerned with adjusting the place and its offerings to attract specific target groups. This makes place marketing more 'demand-driven'. Here, place branding is viewed as the most comprehensive concept of the three, with place marketing and promotion as contributing elements. Place branding also entails a long-term strategic activity (Baker 2012; Hankinson 2010), being holistic and 'identity-driven' (Boisen et al. 2017). It revolves around aligning how the place is perceived, how the place wants to be perceived, and what the place actually is (Clouse and Dixit 2017). This touches upon the topics of 'identity' and 'image'.

Identity

As used in the place branding literature, 'identity' refers to the essence of a place or brand. A critical observation is that the identity of a place and identity of a brand are two different concepts. Here, we therefore differentiate between 'brand identity' and 'place identity'.

If a city wishes to establish a strong and positive place image among its target groups, it needs to distinguish itself through a unique brand identity (Kavaratzis and Ashworth 2005). Therefore, in the place branding process, it is essential to formulate a brand identity that differentiates the city from other cities (Konecnik Ruzzier and De Chernatony 2013). In other words, cities try to find the best possible way of using their natural and created assets, including reputation and identity, to compete with other cities in asymmetric fields (Anttiroiko 2014).

In marketing terms, it is known as the clearly and distinctively expressed core concept of the 'product' (Anholt 2007). The brand identity thus refers to some form of deliberate expression about the essence of the product, with a city being a product in this case. In the context of place branding, the brand identity basically refers to how the place owners want the place to be perceived (Boisen et al. 2011; Hanna and Rowley 2013; Kavaratzis and Ashworth 2005; Ločmele and Mousten 2016; Lu et al. 2017). The 'owner' in the case of a city is the local government, as it is responsible for governing the city. As opposed to the actual place image, many authors consider brand identity as the designed and desired image (Balakrishnan 2009; Cai 2002; Pike 2007). In other words, the brand identity is the desired image in the consumer's mind.

Place identity, on the other hand, from all the terms applied in the place branding literature is the one that causes the greatest conceptual confusion. The identity of a place basically refers to what the place 'really is', as opposed to how people perceive it (place image) or want it to be perceived (brand identity). So far, this has been agreed by most of the scholars in the domain of place branding. However, further conceptualisation of place identity is characterised by ambiguity, and since it is not part of this study, we will not delve into it here.

Image

It was Lynch's book 'The Image of the City' (Lynch 1960) that inspired scholars in marketing and tourism to put 'place image' on their research agenda (Braun et al. 2014). Essentially, his main contribution was the idea of having a mental map of the city: a collective and consensual image, based upon several urban elements. This so-called imageability is supposed to be a guiding principle for the development of cities. Currently, the city image is primarily linked to the domain of place branding.

Place branding research is often criticised for its lack of conceptual consensus. However, the place image (but also the brand image) appears to be an exception. Scholars in the domain seem to agree that the place image is the consumer's

perception or impression of a place (Anholt 2007; Boisen et al. 2017; Kavaratzis and Kalandides 2015; Vanolo 2008). A very clear explanation is provided by Gertner and Kotler (2004, p. 50) who state, "Images represent a simplification of a large number of associations and pieces of information connected with a place. They are a product of the mind trying to process and frame huge amounts of data about a place into a small set of manageable ideas". Thus, (place) brand image is a construct in the mind of people, something that cannot be observed with the bare eye. Secondly, the image construct contains a set of associations in relation to a specific place. The operationalisation of place image as applied in this research is the following: the associations about a place in the mind of any individual or group.

Towards measuring brand image and brand identity

Brand image, which is essentially the same as place image or city image (which is the term we will be using from hereon), is a perception held by people, which influences their practices within a certain place, their participation in policy and decision-making processes, and communication among people. On the other hand, brand identity or desired image, which is *not* the same as place identity, is held by governmental entities; it has an impact on the communication towards people and on interventions in the physical environment.

City image and brand identity jointly influence the activities by people involved, residents and visitors, governmental entities, as represented by politicians and civil servants. Comparing them with each other in terms of similarities and differences through network analysis can support policy-makers in making policy interventions by cities more targeted and effective, while giving affected stakeholders a realistic perspective of what is possible when they provide input into the decision-making process.

Research design and methodology

Operationalisation

The operationalisation of city image and brand identity is mostly a matter of scoping. Choices are made to define the structure of these two concepts. When addressing associations citizens and city officials have towards a city, we adopt a definition by Aaker (2009) who states that consumer brand associations are those perceptions, preferences, and choices in memory that are linked to a brand. When we apply this to the key concepts in the present study, associations pertain to perceptions, preferences, and choices citizens link to a city (associations to city image), and perceptions, preferences, and choices city officials link to a city (associations to brand identity).

In the present study, the city image consists of the associations citizens have about a city. The brand identity is the intended or desired image in the city official's mind. Both concepts revolve around the associations in the consumer's mind. In this study, associations are (i) cognitive and affective (not conative); (ii) general (not place-specific); or (iii) positive or neutral (not negative), or (iv) expressed and related with cities and each other in a network structure.

Mapping brand concepts

In order to measure brand association networks, there are basically two categories of techniques used: consumer mapping techniques and analytical techniques (John et al. 2006; Schnittka et al. 2012). In order to help structure data collection and treatment in a complex environment like a polycentric region both are used in the present study, but in a sequential manner. First, we apply procedures and preparatory methods that pertain to mapping techniques. Then, we apply an analytical technique: network analysis.

Consumer mapping techniques typically cover three stages: elicitation, mapping, and aggregation (John et al. 2006). The elicitation stage aims at eliciting a list of the most important associations for the branded object from consumers. Salient associations are generally gathered from existing research as well as from consumer interviews. The second stage collects individual maps from respondents, based on a predetermined list of associations. The third stage, aggregation, combines the individual maps into a so-called consensus brand concept map. A set of predetermined aggregation rules is used to create the consensus maps. In the present study, this is followed by network analysis. The structure of images as networks provides a basis for network analysis, which allows a quantitative analysis of individual maps and comparison between maps. The resulting process consists of four stages (See Fig. 1).

Introducing an illustrative case of a polycentric region: MRDH

The Metropolitan region Rotterdam The Hague (MRDH) constitutes a region situated in the Dutch province of South Holland. It consists of 23 local authorities. As an administrative entity in between the local and provincial level, MRDH strives to attain the goals of improving accessibility and increasing the economic business climate of the region (MRDH 2018). Here, we are interested in city image and identity of four neighbouring large and medium-sized cities within the MRDH region: (i) The Hague; (ii) Rotterdam; (iii) Delft; and (iv) Zoetermeer. Figure 2 presents the location of the MRDH region in the Netherlands.

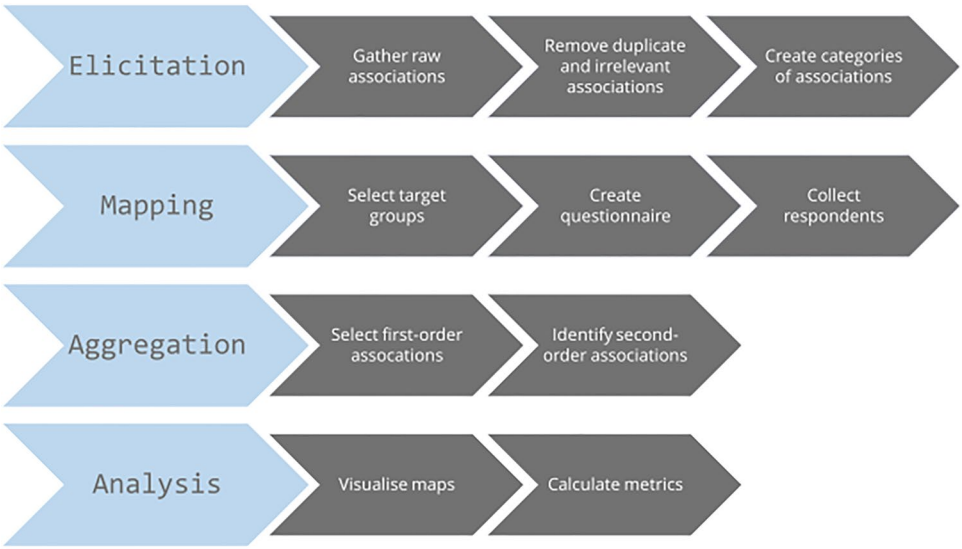

Fig. 1 General process of brand concept mapping and preparing the network analysis

Fig. 2 Location of the MRDH region in The Netherlands (*Source* innovationquarter.nl)

For city image, data are collected among the public, that is a sample of citizens (partly living in the MRDH region, partly not) who are engaged via an online survey ($N=272$). For brand identity, data are collected among a pool of civil servants (specialised in city branding) employed at the four municipalities of the MRDH region previously mentioned ($N=27$). Data of these two groups will be analysed separately, before being compared to establish empirical insights in structural commonalities and differences between perceptions of associations pertaining to city image on the one hand and brand identity on the other hand.

Preparatory work prior to the network analysis

Elicitation

This concerned collection of perceived associations on cities involved exploring data on associations people have with the four MRDH cities as found on the cities' promotional websites, in promotional city guides, and via explorative in-depth semi-structured interviews with city officials of the four cities, with questions on (a) city branding and marketing practices; (b) image and identity; and (c) regional collaboration within the MRDH region. To establish the collection of association, content analysis was used. Results show that whereas some of the cities show a wide variety of associations, such as Delft, The Hague, and Rotterdam, others do less so (like Zoetermeer). Next, duplicates and irrelevant associations were removed, and eventually the associations were combined into 'similar' categories of associations. Based on the researchers' professional expertise, using a dictionary of synonyms and verification of experts, the associations were then classified into groups, and labelled. Next, they were divided into affective and cognitive associations. Subsequently, the list was reduced in size, to create two lists of associations each. Table 1 provides the list of 27 affective and 26 cognitive associations. Table 2 presents an overview of Top 10 city perceptions citizens have for each of the four MRDH cities (count) on city image.

Mapping

Once the main associations are identified, they are presented to respondents. The traditional method for collecting data from respondents is individual mapping. This pertains to asking participants to create individual maps based on the elicited associations. Basically, the respondent then evaluates the following for each of the associations: whether it has a link to the brand, whether it has a link to other associations, and to assess the strength or weight of these links, and to finally evaluate their feelings about the brand and their experiences with the brand.

In our study, however, an online survey was used to collect data from respondents about the perceived associations they have towards the four MRDH cities. Priory, two

Table 1 List of associations from the elicitation stage with abbreviations between parentheses

Affective		Cognitive	
Accessible and central (ACC)	Open, warm, and hospitable (OPN)	Architecture (ARC)	Politics (POL)
Affordable (AFF)	Pure and authentic (AUT)	Arts and culture (ART)	Port/harbour (HRB)
Charming, intimate, and picturesque (CHA)	Relaxing and peaceful (RLX)	Biking (BIK)	Public services (PUB)
Compact (CMP)	Rugged, wilful, and raw (RAW)	Business (BSN)	Recreation and relaxation (RCR)
Cosy, pleasant, and friendly (CPF)	Safe and clean (SAF)	Canals (CAN)	Restaurants and bars (RES)
Creative, cultural, and inspiring (CCI)	Smart and educated (SMR)	Conferences (CON)	Royal (ROY)
Culinary (CUL)	Sober, direct, and innocent (SDI)	Design (DES)	Science and university (SCI)
Diverse, unique, and surprising (DIV)	Sophisticated and impressive (SOP)	Events (EVE)	Shopping (SHO)
Enterprising (ENT)	Strong (STR)	Hiking (HIK)	Sports (SPO)
Historic and traditional (HST)	Sustainable and green (SUS)	Historical heritage (HIS)	Squares and markets (SQR)
Innovative and progressive (INN)	Thriving (THR)	Industry (IND)	Technology and innovation (TEC)
Known internationally (INT)	Undiscovered and mysterious (UND)	Nature (parks, gardens, green) (NAT)	Transport and infrastructure (TRA)
Majestic, chic, and proud (MAJ)	Vivid, atmospheric, and cheerful (VIV)	Nightlife (NGH)	Water (river, lake, sea) (WTR)
Modern, young, and hip (MOD)			

Table 2 Top 10 city perceptions by citizens for the four MRDH cities (City image; count; translation by the authors)

Rank	Delft	Count	Den Haag	Count	Rotterdam	Count	Zoetermeer	Count
1	Students	27	Government	59	Harbour	69	Nothing	106
2	Delft Blue (china)	26	Binnenhof	28	Feyenoord	26	New	14
3	TU Delft	24	Politics	20	Euromast	19	Suburb	13
4	Nothing	20	Scheveningen	11	Modern	12	Don't know	9
5	University	19	Nothing	10	Nothing	10	Boring	9
6	Don't know	19	Parliament	8	Crowded	11	Sleep City	8
7	Blue	15	Cabinet	7	Koopgoot	9	Shopping	8
8	History	14	Crowded	6	Erasmusbrug	7	Nice	6
9	Old	14	Beach	6	Work	6	Family and friends	6
10	Cosy	12	Don't know	5	Don't know	5	SnowWorld	6

questionnaires were developed to assist data collection: one for city image (completed by citizens using an online survey) and one for brand identity (completed by city officials of the four MRDH cities). Whereas the city image questionnaire requires respondents to evaluate all four cities, the brand identity questionnaire focusses on one (relevant) city only, where target group members (i.e. civil servants) are employed. The questionnaires addressed the following topics: perception of the current image of the city, perception of desirable image of the city, words respondents associate with the city, familiarity to the city, feeling about the city, geographical proximity to the city, perceived cognitive image of the city, perceived affective image of the city, and personal information (e.g. age, professional function, and employer). The respondents for the city image survey were reached via an online panel of respondents, who received a small compensation in return for completing the survey.

In total, 272 respondents completed the questionnaire, of which 143 were men (52.6%) and 129 women (47.4%). Regarding age, there were at least 20 respondents for all age groups between 18 and 80 years, with a slight overrepresentation of the age groups between 51 and 60, and 61 and 70. When looking at the province of residence, a substantial part (73 respondents; 26.8%) resides in the Dutch province of South Holland, of which a large part is presumed to be living in or nearby the MRDH region.

Aggregation stage

This requires processing of the data collected in the mapping stage. Following this analysis, relevant associations and links between them are selected. Using the approach by John et al. (2006), several steps were undertaken. First, core brand associations were selected, meaning those associations that

are mentioned most frequently. A balance should be found between clarity and overview. The boundaries within which a balance should be sought were set by the amount of associations for each of the cities (maximum percentile) and the amount of associations in total (minimum percentile). Therefore, it was decided to set a percentile for the amount of links, based on a balance between the maximum amount of associations in total and the minimum amount of associations per city. Using a graph that displays the amount of associations for a corresponding percentile, a minimum frequency of associations was selected. In our study, the minimum 'strength' of a link was 0.38, meaning that at least 38% of the respondents should have picked an association for a city. Additionally, links were made between associations. In light of our analysis, this comes down to establishing links between the first-order associations that are included by the first rule, but also with associations that were not yet included, the so-called second-order associations. We applied the rule that only when the correlation is higher than 0.5, a link can be established between associations.

Network analysis

Knoke and Kuklinski (1982) identify several levels of analysis for network systems. The simplest level is the egocentric network, in which an individual node (a city or association) is highlighted. With an egocentric level of analysis, each city is described using its number and frequency of links with associations. At the other side of the spectrum, the most comprehensive level of analysis is the complete network in which information about the network as a whole is used. The level of a complete network resembles the regional context of a polycentric map. Network analysis, then, can be conducted in two ways. First in a qualitative way, by interpreting a visual representation of the network. And second, in a quantitative way based on the calculation of network metrics.

Visualisation of network diagrams for perceived associations people have with cities helps to compare structure between the map for city image and the map for brand identity. However, this does require software that is able to visualise a network containing nodes (i.e. cities and associations) and edges (i.e. links between the nodes). Moreover, for the second step of this stage, a software package is required to perform network analysis by calculating metrics. For the MRDH case 'Gephi' was used, an open-source software for graph and network analysis (Bastian et al. 2009).

We used three categories of metrics in the network analysis: degree, centrality, and correlation. Degree is determined for individual nodes, at the egocentric level, and indicates the number of links connected to a node. Nodes with a higher degree are typically seen as more important. A second metric, the average weight of degrees, indicates the average strength of links from a node. The strength or weight of an edge is based on the frequency of an association for a city or the correlation between associations. Higher values for this metric indicate a stronger connection to linked associations. The third metric in the degree category is the weighted degree, which sums the weight of all edges connected to a node. Thereby, it combines the degree and average weight of degrees.

The second category of metrics revolves around the centrality of nodes in the network maps. The higher the centrality value, the more central a node's position in the city associations network, and the closer it is to other nodes. Henderson et al. (1998) use closeness centrality as the average distance from a given starting node to all other nodes in the network. The values for the closeness centrality are normalised between 0 and 1, with a higher value indicating a greater centrality.

Third, correlation metrics indicate a linear relationship between the values of two variables. Note that the correlations between associations are part of the aggregation stage. In light of this stage, these variables can be the cities or the region as a whole. The correlation is determined with the frequencies of all associations. There are three different types of correlations with their own use. The first concerns the correlation between cities within one network. This is relevant from a regional point of view, as it indicates whether there are cities with a similar image or desired image. It shows the presence of overlapping and complementary associations. The second concerns correlations between city image and brand identity of cities, a metric also used by Ci and Choi (2017). This comes down to calculating the correlation between the cities in two different networks. A third and final correlation metric concerns the structural relation between complete networks, for example, the correlation between the city image network for residents living in or close to the region and others. Table 3 provides an overview of the interpretation of the metrics mentioned (Barabási 2016).

Comparative analysis of city image and brand identity concerns comparison of the established networks (and the related network metrics mentioned above) for city image and brand identity. Next to comparing metrics, visual comparison and analysis will be conducted. This concerns analysis of key commonalities and differences between the two networks established.

Results of the networks analysis on the MRDH case study

Based on the data collected, two maps were created. Figure 3 presents a network graph for city image. Figure 4 presents a network graph for brand identity. Background information

Table 3 Overview of network analysis metrics used

Analysis	Egocentric level		Network level
Metric	City	Association	MRDH case association network
Degree	Richness of image	Connectivity	Density
Avg. weight of degree	Strength of image	Cohesiveness	Strength of links
Weighted degree	Strength and richness of image	Embeddedness	Density and strength of links
Closeness centrality	Centrality	Centrality	n.a.
Correlation	Similarity	Link in network	Similarity

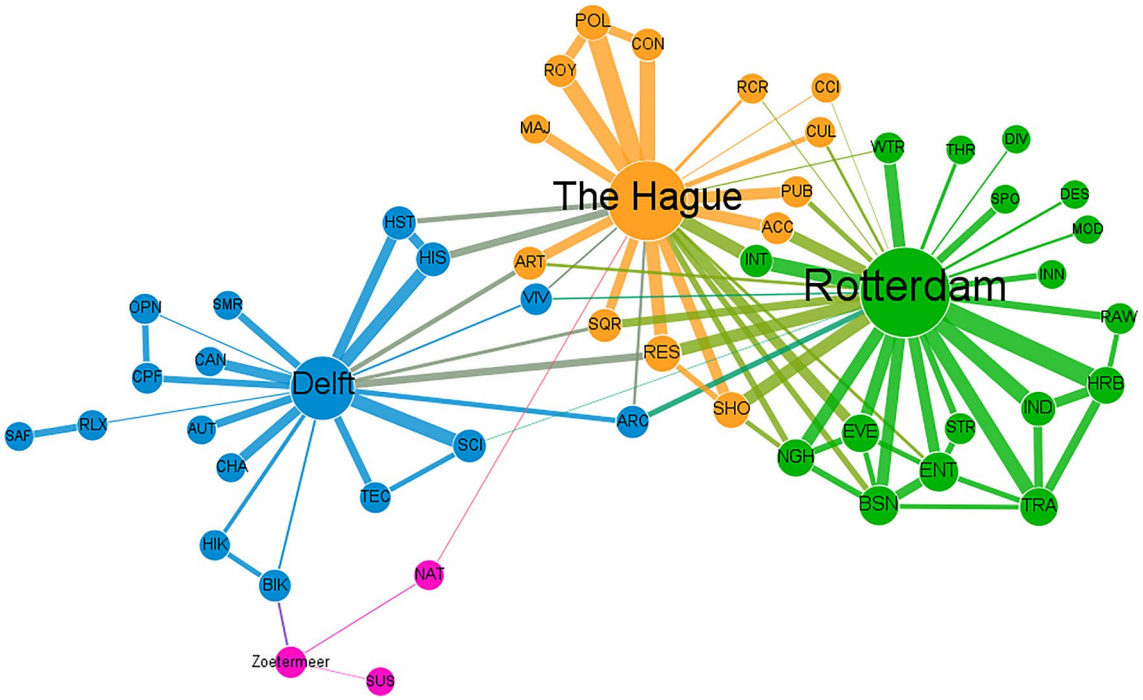

Fig. 3 Network graph of perception of the four cities in the MRDH region by (external) citizens ('city image'). Nodes represent associations and the four cities of the MRDH region. Cities are connected to associations that are mentioned in the surveys, where broader lines indicate stronger associations, i.e. multiple mentions for that association. For clarity, associations are abbreviated (See Appendix Table 7)

on the abbreviations used for the associations can be found in Appendix Tables 7, 8.

Visual interpretation of the networks established

To establish city images it is crucial to have a general understanding of the four cities involved. For instance, the image of the City of Delft focusses on associations like history, canals, science, charming, and cosy. It shares some of these historical associations with the City of The Hague, which has a strong image concerning politics, royal, and conferences. Furthermore, just as the City of Rotterdam, The Hague is known as international and accessible and known for its restaurants, events, shopping, and public services. The image of Rotterdam has the largest set of associations, which could be called either rich or diluted. It contains associations such as the harbour, business, enterprising, transport and industry, and water. On the other hand, the City of Zoetermeer has a rather weak, but focussed image revolving around biking, nature, and a sustainable and green environment.

Looking at the map for brand identity gives another impression of the four cities in the MRDH. What strikes is that Rotterdam and The Hague do not share a similar brand identity, only the association of water is strongly connected to both cities. Again, the image network of Rotterdam is quite diverse, including many different associations. This can be considered in line with the city image. The Hague on the other hand has a strong focus on a couple of interrelated associations including royal, politics, history, and majestic. Furthermore, it shares some associations with Delft, Rotterdam, and Zoetermeer, such as arts and culture, recreation, squares and markets, and biking. Especially these shared

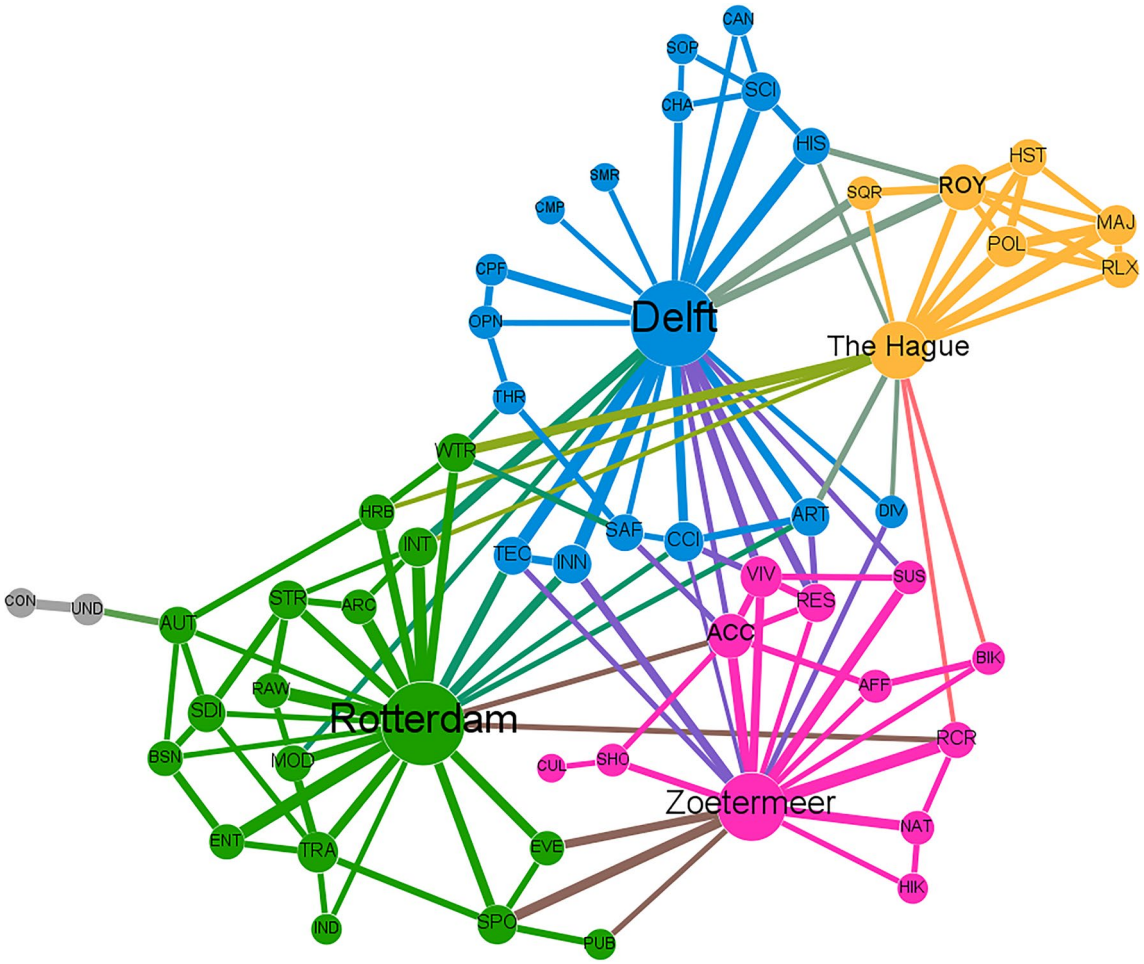

Fig. 4 Network graph of perception of four cities in the MRDH region by city officials ('brand identity'). Nodes represent associations and the four cities of the MRDH region. Cities are connected to associations that are mentioned in the surveys, where broader lines indicate stronger associations, i.e. multiple mentions for that association. For clarity, associations are abbreviated (See Appendix Table 8)

associations do not appear to be in line with the actual image held by the Dutch population. In contrast with the city image map, Delft and especially Zoetermeer have a far richer set of associations. Delft shows similarity with its city image, due to the focus on history, science, and technology. The same goes for Zoetermeer, with its focus on recreation, nature, and sustainability. These widely varying brand identities might indicate that the desired image is not yet clearly defined within the municipality. Apparently, a central theme in the brand identity map is the accessible and central position of the four cities within the MRDH region.

When comparing the city image network graph (Fig. 3) and brand identity network graph (Fig. 4) of the four cities in the MRDH region, several structural differences come to the fore. First, the City of Zoetermeer appears to be (far) more prominent in the brand identity map than in the city image map. Apparently, city officials see a clear identity for the city, while city image respondents (i.e. citizens) do less. For the City of The Hague, the opposite applies: it is more prominent in the city image network, but less so in the brand identity network. Second, the city image network appears more diversified and less interconnected structurally than the brand identity network, which reveals a great number of interconnected (or 'shared') brand labels.

Results of the quantitative network analysis

In addition to the visualisation, several metrics have been calculated to support the statements from the qualitative analysis and provide new insights. Metrics have been calculated in the following categories: degree, centrality, and correlation. For centrality, in similar fashion to Zenker and Beckmann (2013a, b), we present the Top 20 associations for city image and brand identity. They reveal differences in ranking; apparently, citizens have different city perceptions in terms of ranking than city officials (See Table 4).

One of the most interesting findings is based on the correlation metrics (Table 5). Among others, it shows the

Table 4 Top 20 city perceptions (centrality)

Rank	Label	Association (City image)	Closeness centrality	Label	Association (Brand identity)	Closeness centrality
1	RES	Restaurants and bars	0.500	ACC	Accessible and central	0.500
2	VIV	Vivid, atmospheric, and cheerful	0.495	CCI	Creative, cultural, and inspiring	0.491
3	ARC	Architecture	0.495	INN	Innovative and progressive	0.474
4	ART	Arts and culture	0.495	ART	Arts and culture	0.474
5	SQR	Squares and markets	0.495	INT	Known internationally	0.466
6	SHO	Shopping	0.451	MOD	Modern, young, and hip	0.435
7	SCI	Science and university	0.447	VIV	Vivid, atmospheric, and cheerful	0.432
8	ENT	Enterprises	0.418	RES	Restaurants and bars	0.432
9	BSN	Business	0.418	DIV	Diverse, unique, and surprising	0.429
10	EVE	Events	0.415	RCR	Recreation and relaxation	0.429
11	NGH	Nightlife	0.415	SAF	Safe and clean	0.419
12	HST	Historic and traditional	0.411	HRB	Port/harbour	0.406
13	HIS	Historical heritage	0.411	ROY	Royal	0.403
14	ACC	Accessible and central	0.405	STR	Strong	0.394
15	CCI	Creative, cultural, and inspiring	0.405	SUS	Sustainable and green	0.394
16	CUL	Culinary	0.405	HIS	Historical heritage	0.391
17	INT	Known internationally	0.405	ARC	Architecture	0.388
18	PUB	Public services	0.405	SQR	Squares and markets	0.388
19	RCR	Recreation and relaxation	0.405	AFF	Affordable	0.383
20	WTR	Water (river, lake, sea)	0.405	SPO	Sports	0.383

Table 5 Correlations between the cities

	Delft [P]	The Hague [P]	Rotterdam [P]	Zoetermeer [P]	Delft [B]	The Hague [B]	Rotterdam [B]	Zoetermeer [B]
Delft [P]	1.00							
The Hague [P]	−0.07	1.00						
Rotterdam [P]	−0.39	0.17	1.00					
Zoetermeer [P]	0.06	−0.26	−0.25	1.00				
Delft [B]	0.54	0.07	−0.04	−0.21	1.00			
The Hague [B]	0.08	0.44	−0.23	−0.12	0.04	1.00		
Rotterdam [B]	−0.41	−0.09	0.59	−0.14	−0.01	−0.16	1.00	
Zoetermeer [B]	−0.03	0.04	0.14	0.56	0.08	−0.10	0.18	1.00

[P] place image, *[B]* brand identity

correlation between a cities' image and its brand identity (in bold). Only Rotterdam shows a moderately high correlation between its brand identity and city image, indicating that most city images do not align greatly with the brand identities. Furthermore, the city image of Delft has a relative strong negative correlation with the brand identity of Rotterdam. This implies that Rotterdam wants to be seen very different than the actual image of Delft. Finally, the correlation coefficient between the two maps as a whole comes down to 0.48, which reveals a moderate similarity.

Other conclusions can be based on the degree and centrality of the cities in the image networks (Table 6). Based on the degree metrics, Rotterdam and The Hague both have a relatively strong and rich image. Looking at Zoetermeer, the degree metrics show that its desired image is far stronger and richer than its actual image. Using the closeness centrality metric, Delft seems to have a fairly central position in the image and brand identity networks. Together with degree-values just below the main Cities of Rotterdam and The Hague, it is fair to state that Delft is important for the network.

Table 6 Degree and centrality of the cities

	Degree	Avg. weight of degrees	Weighted degree	Closeness centrality (N)
Delft [P]	18	0.55	9.9	0.455
The Hague [P]	24	0.59	14.1	0.505
Rotterdam [P]	29	0.58	16.9	0.531
Zoetermeer [P]	3	0.40	1.2	0.307
Delft [B]	23	0.67	15.5	0.519
The Hague [B]	14	0.58	8.1	0.439
Rotterdam [B]	21	0.70	14.8	0.500
Zoetermeer [B]	17	0.64	10.8	0.435

[P] place image, *[B]* brand identity

Conclusions and implications

The conceptualisation of city image and brand identity in the academic literature shows that many authors are surprisingly consistent on the topics of place image, whereas place identity bears a lot of conceptual confusion. Place/city image and brand identity are the two main drivers of city branding practices, for people on the one hand (place image) and local authorities on the other hand (brand identity). In response to the research question—How to compare between city image and brand identity of cities in polycentric regions?—we showed that image and identity are related to each other in a complex fashion. This can be simplified by looking at the city image in relation with the brand identity, also known as the desired image. Both concepts are at the core of the practices and interventions performed by both people and public institutions in the physical environment of cities. They can be considered the main drivers of communication about the place as well. Place brand managers aspire that, ultimately, the city image is completely in line with brand identity. Polycentricity adds an interesting dimension to the story. Influenced by the way a region evolves into a metropolitan area (as a combination of functional, cultural, and institutional integration), cities in the region might be able to form a (joint) regional identity.

To address the lack of methods to compare the identity and image of places (as addressed by Ci and Choi 2017), we use network analysis of image and identity in place branding, and did this in a polycentric region, instead of a single city. This study complements the place branding literature in three new and essential features. The first one is the application of network analysis of perceived city associations in a polycentric context. By analysing multiple cities within a regional context, it is possible to measure the image and brand identity of more than one branded object. The second feature concerns the way in which data are collected. We complemented traditional ways by introducing a method of computer-aided data collection. This was done by using online surveys which allowed for rapid and large-scale data collection. A third feature concerns the quantitative analysis using network analysis metrics, while carefully preparing this using concept mapping procedures (elicitation, mapping, and aggregation). Conducting network analysis for comparing brand identity and place/city image is not entirely new though (See also Zenker and Beckmann 2013a, b; Ci and Choi 2017). The present study adds two new metrics in this regard: degree and centrality, indicating the importance of associations and cities. Arguably, this can be expanded even further in future research with several other metrics (see Knoke and Kuklinski (1982) that could be relevant for more extensive network analysis.

Using network analysis to the illustrative case of the MRDH region in the Netherlands provided both visual and quantitative insights revealing structural differences between image and identity. Citizens appeared to attach other associations to cities ('city image') than city officials did ('brand identity'). Moreover, striking differences were found in the ways cities are structurally presented between city image maps and brand identity maps (i.e. the cases of Zoetermeer and The Hague). The study also revealed that network analysis can be useful to analyse place branding in both a local and regional context. As such, it might be useful for policymakers working on place branding of their city or region to support strategic decision-making for inter-municipal collaboration based on the measurement of image and identity in a regional context.

Limitations in this study

When reflecting on the use of network analysis in the MRDH case study, a few limitations were identified. First, a polycentric region is more than just the sum of its cities. In the present study, there was a bias towards four large- and medium-sized cities. However, smaller municipalities and the rural hinterland are also part of the region, and should basically not be omitted in an integrated analysis at the regional scale. Another limitation concerns the development of associations that allow for the application of network analysis, when associations of a city are assessed relative to the other cities. Using a different set of cities might result in other sets of associations. Thus, the results of the network analysis should be primarily interpreted in a regional context, in which the image associations for one of the cities are relative to the other cities. It is therefore problematic to compare results from one case study with those of other (future) case studies. Another limitation can be found in the stepwise approach of the method used in this study, since it lacks validation. Finally, reflecting on the statement by Kavaratzis and Hatch (2013) that place image and brand identity are dynamic non-static constructs, the present study entailed a (typical)

cross-sectional network analysis showing a static depiction of time (in the Summer of 2018). Based on this shortcoming, although more commonly found in studies using network analysis, we suggest future research to consider using longitudinal research designs measuring association networks of city image and brand identity over time, for instance, on a year-by-year basis.

Research implications

In the present study, place image and brand identity of cities were analysed in a regional context. This implies that the associations found for these cities are valid and made specific for the regional context in which they are embedded, and do not stand by themselves, i.e. they are relational and context dependent unlike in previous studies. This polycentric aspect makes the present study unique and gives it surplus value, but it also comes at a price. The findings are strongly context dependent and cannot easily be replicated. A promising way of reducing these drawbacks is to further explore, test, and refine the method used in the present study in a larger number of (regional) cases. Arguably, the set of associations from the elicitation stage can then be used as a useful basis for future case studies. Another interesting application might be to apply the method more than once to the same region in a longitudinal research design, which allows for an analysis of the time dynamics of place images. For example, a timeline might show whether the observed place image is evolving in the direction of the (desired) brand identity (or vice versa). Such a study becomes especially valuable when combined with an examination of governance and policy interventions in connection with place branding. For example, a great merit would be to explore whether certain governance arrangements, public policies, and related communication practices are in line with the brand identity or city image and what the impact of policy actions is on city image or what the level of congruence is over time between brand identity and implementation of policy measures supposedly based on this identity.

Two main groups of associations were excluded intentionally from the MRDH study, i.e. 'negative' and 'specific'. However, both can basically be a main part of an individual's place image, whereas place-specific associations are often a part of the city's brand identity. Specific persons or leading landmarks or buildings that are often associated with cities can be linked to the general associations that have been elicited. For the negative associations, scales can be included with a positive description on one side and a negative on the other. Moreover, in the analysis of the present study, the conative component of city image was deliberately excluded. However, as illustrated by Zenker and Beckmann (2013a, b), an evaluative component can be inserted in the network method. Especially for brand managers, evaluating the conative component of place image is likely to provide useful insights. This also applies to assessment of associations, which allows for evaluation of the impact of a certain image.

The present study reveals also the need to see places—and hence their city image and brand identity measures—as connected place offers in terms of the polycentric region approach used. Whereas other researchers foremost analyse one place (e.g. a city), the approach presented in this paper shows that places are in fact highly interconnected. They may offer either the same aspect (i.e. citizens having the same association for these place) or another (i.e. place A benefitting from association to place B as place users perceive this as a joint place offer). Based on this finding, we suggest future research be undertaken into interconnections between cities addressing place connectedness and inter-place collaboration.

Lastly, network analysis can also be used for other purposes than analysing polycentric regions. For example, within the domain of place branding it can be used to create a benchmark between several cities, like international competitors. In this contribution, we hope to have taken an important step in showing the merits of its broader application.

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Appendix

See Tables 7, 8.

Table 7 Network analysis results: cluster, degree, and centrality (city image)

Label	Association (English transl.)	Type	Cluster	Degree	Weighted degree	Avg. w. degree	Closeness centrality
Delft	Delft	City	0	18	9.85	0.55	0.455
Rotterdam	Rotterdam	City	2	29	16.85	0.58	0.531
The Hague	The Hague	City	1	24	14.13	0.59	0.505
Zoetermeer	Zoetermeer	City	3	3	1.23	0.41	0.307
ACC	Accessible and central	Affective	1	2	1.36	0.68	0.405
AUT	Pure and authentic	Affective	0	1	0.58	0.58	0.315
CCI	Creative, cultural, and inspiring	Affective	1	2	0.79	0.40	0.405
CHA	Charming. intimate and picturesque	Affective	0	1	0.63	0.63	0.315
CPF	Cosy, pleasant, and friendly	Affective	0	2	1.09	0.55	0.317
CUL	Culinary	Affective	1	2	0.96	0.48	0.405
DIV	Diverse, unique, and surprising	Affective	2	1	0.42	0.42	0.349
ENT	Enterprising	Affective	2	6	3.31	0.55	0.418
HST	Historic and traditional	Affective	0	3	1.77	0.59	0.411
INN	Innovative and progressive	Affective	2	1	0.53	0.53	0.349
INT	Known internationally	Affective	2	2	1.48	0.74	0.405
MAJ	Majestic, chic, and proud	Affective	1	1	0.65	0.65	0.338
MOD	Modern, young, and hip	Affective	2	1	0.45	0.45	0.349
OPN	Open, warm, and hospitable	Affective	0	2	0.95	0.48	0.317
RAW	Rugged, wilful, and raw	Affective	2	2	1.08	0.54	0.352
RLX	Relaxing and peaceful	Affective	0	2	0.97	0.49	0.319
SAF	Safe and clean	Affective	0	1	0.56	0.56	0.243
SMR	Smart and educated	Affective	0	1	0.57	0.57	0.315
STR	Strong	Affective	2	2	1.09	0.55	0.378
SUS	Sustainable and green	Affective	3	1	0.39	0.39	0.236
THR	Thriving	Affective	2	1	0.47	0.47	0.349
VIV	Vivid, atmospheric, and cheerful	Affective	0	3	1.28	0.43	0.495
ARC	Architecture	Cognitive	0	3	1.48	0.49	0.495
ART	Arts and culture	Cognitive	1	3	1.59	0.53	0.495
BIK	Biking	Cognitive	0	3	1.39	0.46	0.329
BSN	Business	Cognitive	2	6	3.38	0.56	0.418
CAN	Canals	Cognitive	0	1	0.64	0.64	0.315
CON	Conferences	Cognitive	1	2	1.39	0.70	0.340
DES	Design	Cognitive	2	1	0.45	0.45	0.349
EVE	Events	Cognitive	2	5	2.91	0.58	0.415
HIK	Hiking	Cognitive	0	2	0.99	0.50	0.323
HIS	Historical heritage	Cognitive	0	3	1.89	0.63	0.411
HRB	Port/harbour	Cognitive	2	4	2.65	0.66	0.357
IND	Industry	Cognitive	2	3	2.01	0.67	0.354
NAT	Nature (parks, gardens, green)	Cognitive	3	2	0.80	0.40	0.354
NGH	Nightlife	Cognitive	2	5	2.83	0.57	0.415
POL	Politics	Cognitive	1	3	2.13	0.71	0.342
PUB	Public services	Cognitive	1	2	1.18	0.59	0.405
RCR	Recreation and relaxation	Cognitive	1	2	0.86	0.43	0.405
RES	Restaurants and bars	Cognitive	1	4	2.52	0.63	0.500
ROY	Royal	Cognitive	1	2	1.44	0.72	0.340
SCI	Science and university	Cognitive	0	3	1.64	0.55	0.447
SHO	Shopping	Cognitive	1	4	2.40	0.60	0.451
SPO	Sports	Cognitive	2	1	0.58	0.58	0.349
SQR	Squares and markets	Cognitive	1	3	1.68	0.56	0.495

Table 7 (continued)

Label	Association (English transl.)	Type	Cluster	Degree	Weighted degree	Avg. w. degree	Closeness centrality
TEC	Technology and innovation	Cognitive	0	2	1.09	0.55	0.370
TRA	Transport and infrastructure	Cognitive	2	5	2.98	0.60	0.386
WTR	Water (river, lake, sea)	Cognitive	2	2	1.10	0.55	0.405

Table 8 Network analysis results: cluster, degree, and centrality (brand identity)

Label	Association (English transl.)	Type	Cluster	Degree	Weighted degree	Avg. w. degree	Closeness centrality
Delft	Delft	City	0	23	15.50	0.67	0.519
Rotterdam	Rotterdam	City	2	21	14.75	0.70	0.500
The Hague	Den Haag	City	1	14	8.10	0.58	0.439
Zoetermeer	Zoetermeer	City	3	17	10.80	0.64	0.435
ACC	Accessible and central	Affective	3	8	4.60	0.58	0.500
AFF	Affordable	Affective	3	3	1.67	0.56	0.383
AUT	Pure and authentic	Affective	2	5	2.78	0.56	0.375
CCI	Creative. cultural and inspiring	Affective	0	6	3.36	0.56	0.491
CHA	Charming, intimate, and picturesque	Affective	0	2	1.03	0.52	0.346
CMP	Compact	Affective	0	1	0.50	0.50	0.344
CPF	Cosy, pleasant, and friendly	Affective	0	2	1.38	0.69	0.348
CUL	Culinary	Affective	3	1	0.50	0.50	0.273
DIV	Diverse, unique, and surprising	Affective	0	3	1.44	0.48	0.429
ENT	Enterprising	Affective	2	3	2.24	0.75	0.340
HST	Historic and traditional	Affective	1	4	2.60	0.65	0.340
INN	Innovative and progressive	Affective	0	4	3.10	0.78	0.474
INT	Known internationally	Affective	2	5	3.22	0.64	0.466
MAJ	Majestic, chic, and proud	Affective	1	5	3.45	0.69	0.342
MOD	Modern, young, and hip	Affective	2	4	2.49	0.62	0.435
OPN	Open, warm and, hospitable	Affective	0	3	1.70	0.57	0.355
RAW	Rugged, wilful, and raw	Affective	2	3	2.18	0.73	0.372
RLX	Relaxing and peaceful	Affective	1	4	2.39	0.60	0.340
SAF	Safe and clean	Affective	0	5	2.64	0.53	0.419
SDI	Sober, direct, and innocent	Affective	2	5	2.89	0.58	0.348
SMR	Smart and educated	Affective	0	1	0.50	0.50	0.344
SOP	Sophisticated and impressive	Affective	0	2	1.03	0.52	0.346
STR	Strong	Affective	2	5	3.16	0.63	0.394
SUS	Sustainable and green	Affective	3	3	1.85	0.62	0.394
THR	Thriving	Affective	0	3	1.66	0.55	0.346
UND	Undiscovered and mysterious	Affective	4	2	1.39	0.70	0.277
VIV	Vivid, atmospheric, and cheerful	Affective	3	6	3.82	0.64	0.432
ARC	Architecture	Cognitive	2	3	2.12	0.71	0.388
ART	Arts and culture	Cognitive	0	5	2.98	0.60	0.474
BIK	Biking	Cognitive	3	3	1.54	0.51	0.370
BSN	Business	Cognitive	2	4	2.27	0.57	0.346
CAN	Canals	Cognitive	0	2	1.03	0.52	0.346
CON	Conferences	Cognitive	4	1	0.80	0.80	0.218
EVE	Events	Cognitive	2	3	2.01	0.67	0.378

Table 8 (continued)

Label	Association (English transl.)	Type	Cluster	Degree	Weighted degree	Avg. w. degree	Closeness centrality
HIK	Hiking	Cognitive	3	2	1.03	0.52	0.307
HIS	Historical heritage	Cognitive	0	4	2.64	0.66	0.391
HRB	Port/harbour	Cognitive	2	4	2.35	0.59	0.406
IND	Industry	Cognitive	2	2	1.03	0.52	0.338
NAT	Nature (parks, gardens, green)	Cognitive	3	3	1.86	0.62	0.355
POL	Politics	Cognitive	1	5	3.64	0.73	0.342
PUB	Public services	Cognitive	2	2	1.10	0.55	0.338
RCR	Recreation and relaxation	Cognitive	3	4	2.47	0.62	0.429
RES	Restaurants and bars	Cognitive	3	5	2.99	0.60	0.432
ROY	Royal	Cognitive	1	8	5.03	0.63	0.403
SCI	Science and university	Cognitive	0	5	3.22	0.64	0.362
SHO	Shopping	Cognitive	3	3	1.62	0.54	0.372
SPO	Sports	Cognitive	2	5	3.31	0.66	0.383
SQR	Squares and markets	Cognitive	1	3	1.86	0.62	0.388

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