Shopping centres revisited: exploring new attributes of attractiveness

Abstract

Traditional retailing is facing tough challenges, driven not least by the trend towards online shopping. This paper revisits shopping centres research in light of the recent increasing role of technologies, leisure activities and changes in consumer behaviour. Drawing upon 10,544 consumers' unsolicited communications on Twitter relating to the 19 main shopping centres in UK that were posted in May 2019, this research seeks to understand how retail attributes are unevenly distributed across consumers' evaluations to define the attributes driving consumers' evaluations of retail-leisure complexes. Results demonstrate the impact of each identified attribute on preferences for retail-leisure complexes. In particular, findings provide important insights for scholars and practitioners related to the design of future attractive shopping centres. Shopping centres can play an important role in contributing to the viability and vitality of towns. We consider the findings in the light of wider policy and regulatory debates.

Keywords: retailing; consumer behaviour; brand image; place attractiveness; unsolicited consumers' communications; planning.

Introduction

Traditional retailing has been facing tough challenges (Wrigley et al., 2019). Change in retail environments has been a continuous feature, triggered in recent decades by continuous advances in technology, integrated retail-leisure complexes, the increased presence of e-retail stores, and changes in consumer behaviour (Thomas et al., 2004; Clarke et al., 2006; Pantano and Dennis, 2017; Calvo-Porral and Levy-Mangin, 2018). For instance, in August 2018, internet sales for UK consumers accounted for 18% of all retail sales (Rhodes, 2018) (having, according to Euromonitor, grown from only 0.8% in 2000 (Wrigley et al., 2019)). Changes in consumption practices include the shift towards more frequent shopping at small, local convenience stores and less one-stop weekly shops in large shopping centres (Wrigley et al., 2019). These pressures threaten the vitality and viability of town centres and shopping centres. As a result, if traditional retail is to survive and thrive, town centre and shopping centre managers and retailers need to respond to intensified competition and develop location and marketing strategies to successfully compete and (continue to) attract consumers.

This study has significant implications for policy. Other authors have provided succinct descriptions of the the UK planning regime's 'town centre first' policy (see, e.g., Wrigley et al., 2019) that, in the interests of brevity, are not reprised here. There is ample evidence that the presence of large grocery stores in-town and edge-of-town increases town centre shopping from linked trips (Lambiri et al., 2017). On the other hand, there is surprisingly little research concerning the effects of in-town and edge-of-town shopping centres on town centres but Dennis et al. (2002b) demonstrated that in-town shopping centres can markedly enhance the attractiveness of town centres. By way of example, redevelopment of a town centre shopping centre 'transformed the performance of Basingstoke, attracted new retailers and recaptured trade which was leaking … ' (DCLG, 2009, page 25). Powe (2012, page 2226) asserts that 'by

focusing planning efforts on the prevention of inappropriate development outside town centres, there is a danger that insufficient scrutiny will be given to town-centre retail development proposals'. Based on case studies including a town centre shopping centre and an out-of-centre retail park, Powe's (2012) study actually found, 'that improving small-town retail offer through larger format stores (wherever located) claws back significant trade to the towns' (page 2236) and concluded that 'a town-centre-first policy is unlikely to be sufficient to maintain the vitality and viability of town centres' (Powe, 2012, page 2237). Wrigley et al. (2019) and Powe (2012) have drawn attention to the 'critical importance [that consumers attach] to the offer (price, range, quality, availability) of a vital "anchor" supporting … [town] centres' (Wrigley et al., 2019, page 116). Those authors were referring to large grocery retailers as the anchors but similar considerations to apply to shopping centres as anchors for town centres and large (often department store) retailer anchors for shopping centres (Dennis et al., 2002a). In this paper, we seek to update the traditional price, range, quality and availability indicators of attractiveness to encompass additional attributes that really concern shoppers.

The Context of Shopping Centres
In this paper, the term 'shopping centre' refers to a centrally managed, planned retail provision having a number of separately-managed shops (based on Guy, 1994). We choose to study the centrally-managed provision in order to clearly delineate the boundaries of data collection. It is of paramount importance for shopping centre managers to understand the extent to which shopping centre patronage varies as a function of consumer evaluations of shopping centre characteristics (Finn and Louviere, 1996). Most scholarly research into consumers' shopping centre choices is based on the concepts of "image" or "attractiveness" as the constructs that positively influence patronage behaviour and consumers preferences (e.g. Dennis, et al., 2002b; Teller and Elms, 2010). Similarly, image and attractiveness are employed in tourism literature for characterizing places, locations and destinations capable of generating visitors flow (Jacobsen, Iversen, and Hem, 2019; Min, Martin, and Jung, 2013). Tourism place attractiveness consists of a set of attributes that visitors perceive as able to provide value (Lee and King, 2019), including natural and cultural resources (e.g. landscapes, museums, archaeological parks, etc.), transportation and infrastructure (e.g. public transport and highways/roads, health services, barrier-free facilities, etc.), popularity, recreational and shopping facilities such as souvenir and gift shops (e.g. Jacobsen, Iversen, and Hem, 2019; Lee and King, 2019; Giglio et al., 2015; Stylidis, 2018). Some studies define shopping centre attractiveness mainly based on traditional attributes, such as size and number of anchor stores, layout, location, transportation, opening hours, security, atmospherics, and facilities (Teller and Elms, 2010; Teller, 2008; Dennis, et al., 2002b; Dolega, Pvlis, and Singleton, 2016; Blut, Teller, and Floh, 2018; Calvo-Porral and Levy-Mangin, 2018), or transportation related attributes (Dolega, Pvlis, and Singleton, 2016; Finn and Louviere, 1996; Oppewal et al., 1997; Teller and Reutterer, 2008). However, current retail strategies are further based on the integration of modern technologies to better engage with consumers, from interactive storefront windows able to solicit consumers to enter the stores to robotic companions to assist consumer while shopping (Pantano and Vannucci, 2019; Bertacchini et al., 2017; Roy et al., 2018; Willems et al., 2017). For instance, in 2017 Westfield Corporate introduced into its shopping centres in San Francisco and Silicon Valley (US) Pepper robot (produced by Softbank) to help drive store traffic and entertain shoppers. Shopping centres have themselves in the past been considered as symbols of modernity (Connell, 1999; Degen et al., 2008; Erkip, 2003), creating 'a new world of indoor capitalism predicated on comfort and convenience' (Winter, 2018, page 527) and technological

development has been seen to give shopping centres a more modern image (Newman et al., 2006; 2010). In less-developed countries, shopping centres can add image of modernity even when the underlying reality is not modern (Koch, 2012). Conversely, in countries such as the UK, where shopping trends are moving away from the large, centralised and towards local and online (Wrigley et al., 2019), shopping centres can no longer rely on their intrinsic modernity and, we suggest, need to develop in new (perhaps technological) directions in order to counter their declining perception of modernity. Indeed, from being a threat to town centres by cannibalising their business (Teller, 2008), shopping centres are now in decline, with 200 in the UK 'on the brink of administration' (Stevens, 2018, no page numbers); a decline driven by the rise of online shopping and plummeting rental incomes following the demise of anchor and other major stores and a rash of Company Voluntary Agreements (CVAs) (Radojev, 2019). To put the scale of the problem into perspective, *Retail Week* reports that 20 percent of floorspace in 50 shopping centres owned by the UK's four largest shopping centre owners in administration, a CVA or declining sales, leading to 'a "vicious circle" of store closures … "less pleasant" shopping experiences and further reduced foot traffic (Radojev, 2019, no page numbers). The situation is said to leave 'small towns ... in danger of "catastrophic" ramifications' (Stevens, 2018, no page numbers). To our knowledge, scholarly research is yet to address these issues.

In the light of fast technological development in the real retail world, existing academic studies still provide but little understanding of the attributes defining modern shopping centre image. That is to say, to date there has been little or no attempt to synthetize and evaluate the relative contributions of leisure, (online and offline) social influence, modern technology, and so on in consumers' choices of modern retail complexes. Relatedly, there has been little or no recent research into how shopping centres might retain and develop their images of modernity in the face of changes sweeping the UK retail landscape such as growth in online/mobile shopping and the trend towards more local, convenience shopping experiences (Wrigley et al., 2019). The paucity of relevant research is surprising, given the importance of shopping centres to retail vitality and viability and the importance of the associated planning regime as outlined above. The aim of this study, therefore, is to examine and update consumer preferences for retail-leisure complexes as a function of different attributes. This discussion leads to the following research questions:

RQ1. What are the attributes characterizing modern shopping centres according to consumers' perspectives?
RQ2. How can the evaluation of these attributes help the future developments of shopping centres?
RQ3. To what extent can the analysis of unsolicited consumers' communications support the understanding of consumers' insights into their choices of shopping centres?

To explore the above questions, the study will examine consumers' preferences through their unsolicited communications. Consumer choice is assumed to be influenced by different decision constructs. Consumers' posts on Twitter represent a useful source of unsolicited communications. Accordingly, we collected all the tweets shared by consumers in May 2019 related to the 19 main shopping centres in UK. Applying Wolfram Mathematica software, we then conducted a sentiment analysis and a textual analysis of the contents to identify the main attributes that consumers used to characterize the shopping centres.

The study focuses on the UK context, being the European country with the highest retail sales in 2019 compared with the other major European economies (i.e. France, Germany, Italy, Spain, and the Netherlands) (Mintel, 2018a). The UK retail sector economic output was £92.8 billion in 2017, employing 2.8 million in 2017 in 319,000 retail business in 2018 (Rhodes, 2018), with 82% of total sales being made offline. Moreover, shopping centres are fundamental to the UK retail scene, never more so than currently, as (unplanned) town centre retail struggles with an increasingly tough environment (Mintel, 2018b).

The remainder of this paper is organised as follows. First, we summarize prior studies on shopping centre image and branding, and discuss consumer preferences for shopping centres. Here, we argue the emergence of new technologies influencing the choice of shopping centre and enhancing shopping experiences. Next, we outline the design of the methodology based on automated text analysis, followed by a discussion of the automated text analysis employed. Then, we provide details of the sample and data collection. The next section reports and interprets the elicited attributes and discusses their relative weight, thus defining a new set of factors driving consumer choices of shopping centres. The paper is ends with a discussion of implications of these research findings for future researchers, for the development and management of shopping centres and wider implications such as planning.

Theories of shopping centre image, branding and choice
One of the main roles of brand is to influence consumer brand consideration and choice (van der Lans, van Everdingen and Melnyk, 2016). Brand characteristics include awareness, association, perceived quality and brand loyalty (Aaker, 1992), occurring when a consumer is familiar with a brand leading to favourable, unique associations in memory (Keller, 1993). Subsequent studies further identify uniqueness and consumers' perceived value as components of a brand (Netemeyer et al., 2004). In the context of a specific destination or place, Tasci (2018) synthetizes the elements contributing to brand image formation as awareness/familiarity, image/associations, perceived quality, brand value/perceived price premium, consumer value/perceived value, consumer satisfaction, and consumer loyalty/brand loyalty. Familiarity with a place brand further leads to a sense of wellbeing (Lager et al., 2016). Image/association represents the link between the associations that people hold with a place and how s/he internalizes those associations to facilitate the formation of a place brand (Kavaratzis and Kalandides, 2015). Focusing more specifically, shopping centres can be considered as brands, the more strongly branded ones tending to be more successful (Dennis, 2005). Consumers' experiences are key to the success of brands (Brakus et al., 2009), not least retail brands (Dennis et. al., 2017); Degen et al. (2008) call for more research into how shopping centres are experienced. Social influences are critical, for example, shopping with a companion (friends, relatives, etc.) contributes to co-creating the shopping brand experience (Merrilees and Miller, 2019). Online social influences affect brands (Passavanti et al., in press) and, we suggest, these influences might also affect shopping centre brands. Improving brand images of shopping centres should result in more customers, higher volumes of sales turnovers and higher rental incomes for shopping centre owners (Dennis et al., 2002a).

Early research demonstrates that consumers derive utility from the attributes of shopping centres (Timmermans, 1982). Models used in a marketing context have tended to adopt the traditional marketing mix model to stress attributes such as price (promotions and sales) (Jackson et al., 2006; Calvo-Porral and Levy-Mangin, 2018), atmospherics (including colours, lighting, music, aroma, etc.) (Teller and Elms, 2010; Teller et al., 2010), size in terms of number and diversity of stores (Dennis, Marsland, and Cockett, 2002a; Dolega, Pvlis, and

Singleton, 2016; Blut, Teller, and Floh, 2018; Teller and Elms, 2010; Teller et al., 2010), entertainment and leisure activities (including cinemas, restaurants, etc.) (Dolega, Pvlis, and Singleton, 2016; Sit, Merrilees, and Birch, 2003; Calvo-Porral and Levy-Mangin, 2018), service (including speed, queues, interactions with salespeople) (Elmashhara and Soares, 2019; Finn and Louviere, 1996; Diallo et al., 2018; Laroche et al., 2005), and image (including popularity of the shopping centre) (Brito, 2009; Sit, Merrilees, and Birch, 2003).

Models used in a retail planning context mainly focus on the trade-off between the convenience benefits (including also the number of favoured stores and anchor stores) and the benefits in terms of location/distance, car parking, longer opening hours, and/or accessibility (Calvo-Porral and Levy-Mangin, 2018; Thomas et al., 2004; Finn and Louviere, 1996; Lloyd et al. 2014 Oppewal et al., 1997; Teller and Reutterer, 2008; Dolega, Pvlis, and Singleton, 2016). Specifically, scholarly research in the retail planning literature tends to aggregate shopping centres' attributes such as size in terms of floorspace and number of stores/anchor store, diversity, parking facilities, distance, car ownership, and so on (Thomas et al., 2004; Finn and Louviere, 1996; Lloyd et al. 2014 Oppewal et al., 1997; Dolega, Pvlis, and Singleton, 2016). Results of these studies further highlight the effects of demographics, distance, geographical position and transportation cost.

Despite extensive use of these models for investigating consumer choice behaviour and assessing the feasibility and impact of new retail development, to our knowledge, prior studies typically take little account of leisure motivation and the impact of the modern scenario of new technologies (for an exception, see Dennis et al., 2010). Indeed, the boundaries between functional shopping and leisure/entertainment enriched with technologies have blurred over the years as shopping centres have progressively introduced more entertainment and leisure infrastructures, extended opening hours, and facilitated exhibitions and events (Calvo-Porral and Levy-Mangin, 2019). Modern shopping centres have undergone a transition from a basic location for shopping to a highly structured space for entertainment, interaction and other engaging activities, including food courts and restaurants, play areas for children, cinemas, relaxation areas, etc. (Calvo-Porral and Levy-Mangin, 2019; Farrag et al., 2010).

Modern retail marketing increasingly utilizes new technology-based services that assist potential shoppers to (i) find the stores, promotions and events, (ii) deliver personalized messages, and (iii) digitally embrace consumers while in the centre (Bertacchini et al., 2017; Frishammar et al., 2018). However, research into the effects of these technologies on consumers' choice of shopping centres or on consumers' experiences is still in an early phase of development.

Thus, the development of multi-functional retail-leisure complexes, the growing importance of social media, changes in consumers' habits and continuous progress in new technology to enhance shopping experience make shopping centres' strategies more complex, requiring more research. Any study of consumer preferences for modern shopping malls should, therefore, include this wider spectrum of attributes that may influence consumer behaviour and, consequently, the feasibility of new retail developments and their likely impact on existing shopping centres.

Nevertheless, recent years have also seen the phenomenon of retail disinvestment and decline of shopping centres globally (Ferreira and Paiva, 2017; Coe, Lee and Wood, 2017). Thus, new research is needed to examine shopping centres' attributes as part of consumers' evaluations and choices of the shopping centres, able to draw on recent advances in retail planning. Some of these factors are relatively new, and consequently, new approaches are needed in order to evaluate them.

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Method

Traditionally, quantitative research on consumers' evaluations and choices of shopping centres is based on (on-site) interviews with limited numbers of participants (rarely more than 500) at a limited number of shopping centres, in which the questions are designed to solicit responses related to particular variables identified previously based on prior research (Miller, 2014; Calvo-Porral and Levy-Mangin, 2018); while qualitative research is conducted with smaller samples of participants (usually less than 50) to solicit consumers opinions and experiences through open ended questions (Dennis et al., 2002b; Newman et al., 2006; 2010).

On the other hand, the increasing availability of data generated spontaneously by consumers as texts, reviews, pictures, posts, tweets, etc., and the simultaneous availability of cheaper tools for analysis also is encouraging researchers in social sciences and management to develop new methods for data analytics and interpretation (Humphreys and Wang, 2018; for a retail example, see Pantano and Dennis, 2019). In this paper, we follow the usual steps for automated text analysis in consumer research (Humphreys and Wang, 2018), using *Wolfram Mathematica* and *WordStat* softwares to operationalize, analyse and validate the data. As suggested by Humphreys and Wang (2018), automated text analysis executed via computer helps in quantifying constructs through new ways of aggregating and displaying data to identify patterns that might not be obvious at the granular level. In particular, the analysis of the contents of tweets (text) allows the researcher to determine how and how much certain concepts are mentioned and with what they are associated. Results can be used to gain insights into consumer psychology through the analysis of large amounts of unsolicited online communication on platforms such as, for example, Twitter (Walasek, Bhatia and Brown, 2018). The use of machine learning algorithms such as those of Wolfram Mathematica and WordStat allows 'big data' such as tweets that are non-accessible by human coding to be structured and coded. Such methods can track shifts in sentiment and other content categories (Hartman et al., 2019).

In order to ensure that we collected data related to identifiable retail agglomerations, with bounded, definable attributes, we confined data gathering to shopping centres. To this end, we selected for study the main 19 shopping centres from across UK (Table 1) (selecting the largest in order to ensure sufficient numbers of tweets for the analyses).

Rank	Shopping Centre	City/Town	Region	No. of shops
1	Westfield London	Shepherd's Bush, London	Greater London	404
2	Westfield Stratford City	Stratford, London	Greater London	322
3	Bluewater	Greenhithe, Kent	South East England	292
4	Meadowhall	Sheffield	Yorkshire and the Humber	287
5	intu Metrocentre	Gateshead, Tyne and Wear	North East England	247
6	Manchester Arndale	Manchester	North West England	224
7	intu Lakeside	Thurrock, Essex	South East England	202
8	intu Trafford Centre	Trafford, Greater Manchester	North West England	198
9	intu Merry Hill	Dudley, West Midlands	West Midlands	192

Rank	Shopping Centre	City/Town	Region	No. of shops
10	Bullring Estate	Birmingham	West Midlands	166
11	intu Eldon Square	Newcastle	North East England	143
12	intu Braehead	Renfrew, Renfrewshire	Scotland	136
13	Liverpool One	Liverpool	North West England	125
14	Frenchgate Centre	Doncaster, South Yorkshire	Yorkshire and the Humber	116
15	Westgate Oxford	Oxford, Oxfordshire	South East	113
16	Trinity Leeds	Leeds	Yorkshire and The Humber	108
17	Highcross	Leicester	East Midlands	107
18	Queensgate	Peterborough, Cambridgeshire	East	87
19	Cabot Circus	Bristol	South West	86

Table 1. The top 19 shopping centres in the UK, ranked by number of shops.
Source: Compiled by the authors from centres operators' data.

Data collection and procedure
The research employed content analysis on all tweets in the study period that included the name of each shopping centre. In other words, the tweets related to each shopping centre have been collected individually through *Wolfram Mathematica* and then analysed together. The software allows the tweets to be collected through access to external Twitter API, where the query command allows any tweet to be collected when specifying the unique Twitter name of the shopping centre. We repeated this procedure for each shopping centre.

In total, 10,544 tweets posted by unique Twitter accounts were collected through *Wolfram Mathematica* in May 2019. All the collected tweets are in English, and they have been posted by users between 20 and 40 years old.

The first analysis was related to sentiment analysis of the tweets, through the functions *Classify* and *Sentiment* methods for the evaluation of sentiment involved in each tweet. These functions are specific machine algorithms already available in the software. This analysis facilitates understanding consumers' online opinions (in the form of tweets, posts, reviews, etc.) by assigning the value of positive, negative or neutral to each element (Mostafa, 2013; Pantano, Giglio and Dennis, 2019). Machine learning algorithms are able to systematically detect the sentiment involved in structured and unstructured data (text, video, images, etc.). The analysis returned 798 negative tweets, 2,705 neutral tweets, and 6,118 positive tweets (6 tweets did not include any text and the software returned the value "indeterminate" since it was not able to assign the specific label).

Figure x. Sentiment analysis results for 19 shopping centres (10,544 tweets from unique users).

The sentiment analysis provided an overview of what consumers said about the shopping centres. Although the tweets contain mostly positive evaluations, the analysis also reveals some negative comments. The subsequent analyses investigated further detail of consumers'

evaluations, by (i) frequency analysis and phrases extraction through *WordStat* software, and (ii) cluster analysis with *Wolfram Mathematica*. Specifically, *WordStat* supports the quantitative analysis of textual data through the automatic extraction of the most important words from the tweets (text) in order to identify the thematic structures through executing a word frequency matrix. Such techniques are now being employed in marketing and management research (Davlembayeva, Papagiannidis, and Alamanos, in press).

The subsequent factor analysis was conducted with Varimax rotation in order to extract the most important factors (i.e., the most frequent phrases, all the phrases with factor loadings higher than a specific criterion considered as part of the extracted factor).

Elicitation of attributes

In order to specifically analyse the shopping centre attributes based on the frequency analysis, the procedure extracts the number of word occurrences in the collected tweets. Since some words are rarer than others but more predictive, it is necessary to weight such words more heavily, tf-idf corrects the infrequently occurring words as:

$$tf - idf \ (\text{word } w, \text{document } d, \text{corpus } D)$$

$$= [1 + \log(\text{number of occurrences of } w \text{ in } d)$$
$$\times \log \ \left(\frac{\text{total number of documents in } D}{\text{number of documents containing } w}\right)$$

Table 2 summarizes the word frequency and the percentage of cases in which the single word is displayed, taking into account tf-idf per each word.

	FREQUENCY	% CASES	TF • IDF
TIME	867	8.80%	915.1
GREEN	694	7.13%	796.1
GIVEAWAY	478	4.91%	625.7
STYLISH	467	4.80%	616
SUNNIES	466	4.79%	615.2
GREAT	403	3.92%	566.8
SHOPPING	381	3.73%	544.3
OFFICIALEIHL	380	3.90%	535.3
STORE	355	3.43%	520
CENTRE	344	3,45%	503
WEEKEND	305	3.06%	461.8
BIRMINGHAM	301	2.62%	476.2
FOLLOW	260	2.67%	409.1
GOOD	260	2.63%	410.9
OPENING	250	2.49%	401.2
ARTAIFESTIVAL	244	1.94%	417.7
FAMILY	215	2.07%	361.9
HOURS	212	2.17%	352.8
SATURDAY	210	2.15%	350.3
AMAZING	208	2.13%	347.9
SUNGLASSES	201	2.05%	339.2
SUMMER	193	1.93%	330.9
CELEBRATE	179	1.84%	310.7
FOOD	164	1.56%	296.3

TUESDAY	161	1.64%	287.3
STORES	160	1.64%	285.5
LOVELY	148	1.52%	269.1
PARADE	148	1.51%	269.5
EVENT	148	1.40%	274.5
CAR	141	1.30%	265.7
JOIN	140	1,38%	260.6
HOLIDAY	136	1.40%	252.3
GOLF	134	0.72%	287.2
SHOP	131	1.29%	247.3
PARK	129	1.24%	245.8
FRIDAY	128	1.30%	241.2
SERVICE	126	1.19%	242.4
FUN	114	1.13%	222
CELEBRATING	112	1.15%	217.2
ENJOY	107	1.10%	209.6
HAPPY	103	1.03%	204.8
FANTASTIC	97	1.00%	194.2
SUNDAY	95	0.98%	191
MONDAY	91	0.93%	184.7
STAFF	89	0.87%	183.3
SUPPORT	82	0.84%	170.1
OFFER	82	0.81%	171.4
FRIENDS	76	0.76%	161.1
HOME	75	0.75%	159.4
LAUNCH	75	0.72%	160.8
RESTAURANT	73	0.74%	155.6
ART	71	0.68%	154
AWARD	69	0.70%	148.8
PARKING	69	0.63%	152
EXPERIENCE	68	0.65%	148.9
WONDERFUL	67	0.69%	144.9
SQUARE	66	0.68%	143.1
PARTY	66	0.65%	144.5
LOCAL	65	0.65%	142.3
LUNCH	65	0.63%	143.2
CLUBS	64	0.66%	139.7
NATURE	64	0.61%	141.9
INCREDIBLE	63	0.65%	137.9
BRILLIANT	63	0.64%	138.4
FESTIVAL	63	0.61%	139.7
AWESOME	62	0.64%	136.2
DELICIOUS	62	0.63%	136.6
RECYCLING	62	0.63%	136.6
DUST	61	0.63%	134.4
PERFORMANCE	61	0.62%	134.8
SALE	60	0.53%	136.3
CENTRAL	59	0.61%	130.8
EXCITING	58	0.60%	129.1
REMEMBER	57	0.59%	127.3
COLLECTION	57	0.58%	127.7
BRAND	57	0.56%	128.1
AI	57	0.55%	128.6
THURSDAY	56	0.58%	125.5

STAGE	56	0.58%	125.5
LAKESIDE	53	0.52%	120.9
RECYCLE	52	0.51%	119.1
SERVICES	51	0.52%	116.3
MARKET	49	0.50%	112.6
SHARE	49	0.50%	112.6
TEA	47	0-46%	109.8
DATE	46	0.47%	107
RESTAURANTS	46	0.47%	107
TRAFFIC	46	0.38%	111.3
FABULOUS	45	0.46%	105.1
BEAUTIFUL	44	0.44%	103.6
CLOSED	44	0.43%	104.1
RANGE	43	0.44%	101.3
DETAILS	43	0.44%	101.3
DOORS	42	0.43%	99.3
MEADOWHALL	42	0.43%	99.3
EVENTS	41	0.41%	97.8
SUNNY	40	0.41%	95.5
TWITTER	40	0.34%	98.8
ANNOUNCE	39	0.40%	93.5
STATION	38	0.39%	91.5
LOCATED	38	0.39%	91.5
GIFT	38	0.39%	91.5
EAT	38	0.39%	91.5
DRINK	37	0.37%	90
DANCE	37	0.37%	90
STREETFOOD	36	0.37%	87.6
DELIGHTED	35	0.36%	85.6
REST	35	0.36%	85.6
PARKS	35	0.36%	85.6
BUS	35	0.35%	86
CHOICE	34	0.35%	83.5
BAG	34	0.34%	84
SHOPS	34	0.33%	84.4
APP	34	0.33%	84.4

Table 2. Frequency analysis of the most recurrent words in the users' tweets related to the 19 shopping centres.

The frequency analysis extracted the 114 most frequently-used words. A concept map, representing the proximity values computed on the 114 most recurrent words using multidimensional scaling (MDS), graphically shows the distances between pairs of words indicating how likely those items were to appear together (Figure 1). Thus, words that appear close together on the plot usually tend to occur together, while words that are independent from one other or that do not appear together are located far from each other on the chart. Colours are used to further represent membership of specific items to different partitions created using hierarchical clustering, while the different sizes are related to the frequencies of the individual items (the higher the frequency, the bigger size).
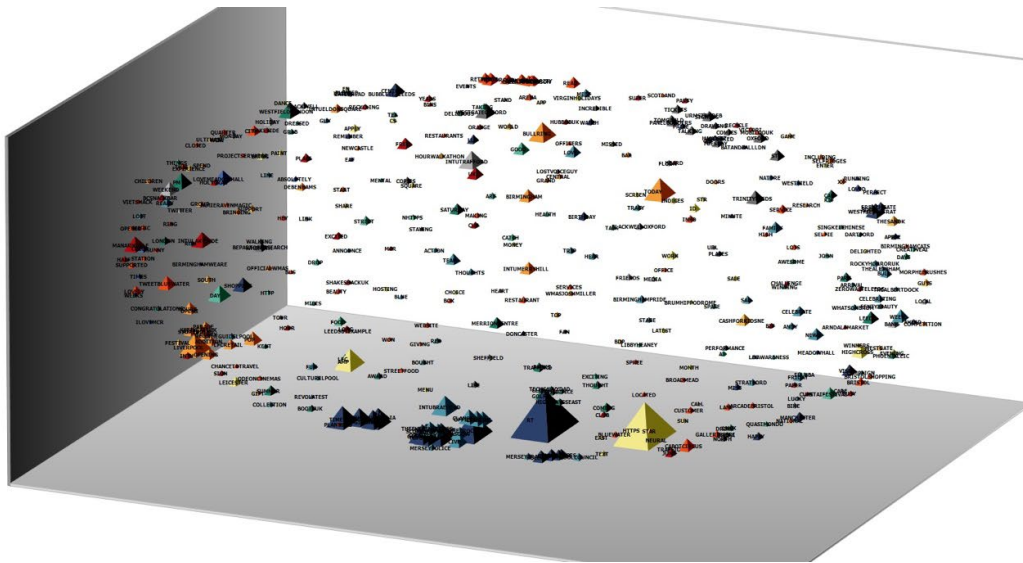
Figure 1. The concept map representing the proximity values computed on the 114 most recurrent words.

Drawing upon the frequency analysis, the topic modelling tool further automatically identifies idiomatic expressions and common phrases. In this way, it is possible to discover the hidden thematic structure of a text collection by applying a combination of natural language processing and statistical analysis. To this end, *WordStat* adopts a factor analysis with Varimax rotation, in order to extract a small number of factors, each of which is associated with a certain loading. To ensure the stability of the factoring solution in our results, low-frequency items were excluded. This analysis led to the identification of 65 phrases (Table 3).

	FREQUENCY	% CASES	TF • IDF
GIVEAWAY TIME	468	4.81%	616.9
CHANCE WIN STYLISH PAIR XXX	462	4.74%	611.6
OPENING HOURS	128	1.31%	240.8
ART AI FESTIVE	128	1.31%	240.8
ATTENDING TODAY'S VICTORY PARADE	124	1.27%	235.0
OPENING HOURS LIVERPOOL STORES	124	1.27%	235.0
BANK HOLIDAY	109	1.12%	212.7
TUESDAY ST	97	1.00%	194.2
BANK HOLIDAY WEEKEND	69	0.71%	148.3
SUMMER COMING	63	0.65%	137.9
SIGNING COPIES	61	0.63%	134.4
CAR PARK	60	0.55%	135.4
CITY CENTRE	59	0.61%	130.8
CUSTOMER SERVICE	43	0.42%	102.2
READY CELEBRATE	41	0.42%	97.4
YEAR S ARTAIFESTIVAL	41	0.42%	97.4
FAMILY CLUB	39	0.32%	97.4
MENTAL HEALTH	39	0.34%	96.3
CELEBRATING ARRIVAL	34	0.35%	83.5
CAR PARKS	33	0.34%	81.5
SUNNY DAY	31	0.32%	77.4
TEAM NATURE	31	0.32%	77.4

CUSTOMER SERVICES	28	0.29%	71.2
NATURES VOICE	28	0.29%	71.2
BOOK SIGNING	25	0.26%	64.8
FOOD COURT	25	0.24%	65.7
GOOD DAY	25	0.26%	64.8
STAYING COOL	24	0.25%	62.6
SUMMER SALE	24	0.24%	63.0
THAI RESTAURANT	24	0.25%	62.6
CHAMPAGNE BAR	23	0.24%	60.4
SIGN COPIES	20	0.21%	53.7
PLEASE DONATE AID CAS HFOR	19	0.20%	51.5
OPENING DATE	19	0.20%	51.5
HAPPY BIRTHDAY	18	0.18%	49.2
ICE CREAM	18	0.18%	49.2
RECYCLE PAPER CUPS	18	0.18%	49.2
BUBBLE TEA	17	0.17%	46.9
STREET FOOD	17	0.17%	46.9
BUS STATION	16	0.16%	44.5
CABOTCIRCUS MARCUSINSTROUD	16	0.16%	44.5
CATCH TODAY SATURDAY DROP COMICS	16	0.16%	44.5
CUP RECYCLING XXXX SHOPPING CENTRE	16	0.16%	44.5
JOHN LEWIS	16	0.16%	44.5
FAMILY FRIENDS	15	0.15%	42.2
FATHERS DAY	15	0.15%	42.2
HIGH STREET	15	0.15%	42.2
STREET ART	15	0.15%	42.2
ARTAIFESTIVAL COME VISIT AWESOME AI	14	0.14%	39.8
IMMOTION VR	14	0.14%	39.8
PERFUME SHOP	14	0.14%	39.8
RECYCLING REWARD MACHINE	14	0.14%	39.8
STORE OPEN	14	0.14%	39.8
XXX PLUS APP	13	0.13%	37.4
PAPER CUPS RECYCLING	13	0.13%	37.4
RAISING AWARENESS	13	0.13%	37.4
SUPER EXCITED	13	0.13%	37.4
FREE EVENT	12	0.12%	34.9
FREEDOM RALLY	12	0.12%	34.9
LIMITED EDITION	12	0.12%	34.9
LOYALFREE APP	12	0.12%	34.9
NATIONAL CHILDREN S DAY	12	0.12%	34.9
PLACES LOVE VISIT	12	0.12%	34.9
RETAIL THERAPY	12	0.12%	34.9

Table 3. Phrases extracted via *WordStat*.[1] from tweets related to the 19 shopping centres.

The words or categories such as phrases that often appear together might be combined in a cluster at an early stage while those that are independent of each other or that do not appear together tend to be combined at the end of the agglomeration process. The cluster analysis in *WordStat* allows words to be grouped based on their co-occurrences. The output of a hierarchical cluster analysis usually consists of a dendrogram (or tree chart), where the vertical axis is composed of words and the branches on the horizontal axis are the clusters formed in

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[1] Names associated with a specific shopping center have been replace by 'XXX' to ensure anonymity.

each phase of the clustering procedure. Specifically, we chose the following parameters: (i) words with a frequency more than 34 (as emerged in the frequency analysis in Table 2), (ii) phrases with frequency more than 12 (as emerged in the phrases extraction in Table 3), and (iii) no clusters with just one word. This procedure results in the extraction of 237 clusters (see appendix A for the full dendrogram). Since the number of clusters is still high to provide a clear overview of the attributes defining a modern shopping centre in consumers informal communications, the final analysis consists of clustering through *Wolfram Mathematica*. In this case, the software provides a machine learning algorithm, *FindCluster*, to support both non-hierarchical and hierarchical clusters. This software identified 23 clusters, autonomously adopting 'Agglomerate' as the cluster hierarchy method. This type of hierarchical cluster algorithm is defined as bottom-up, since this algorithm initially considers each unit of data as a single cluster and then joins (agglomerates) clusters of clusters until all clusters have been merged into a single cluster that contains all the data points. For this reason, it is also known as hierarchical agglomerative clustering (HAC). Drawing upon the obtained clusters, it is possible to generate a tree weighted by the hierarchical clustering of the elements, by applying the "ClusteringTree" machine learning. This function allows construction of a weighted tree from the hierarchical clustering of the emerged clusters as input. In particular, the representation is as a tree, where the root of the tree is the unique cluster that collects all the samples, the leaves are clusters with a single sample (Figure 2).
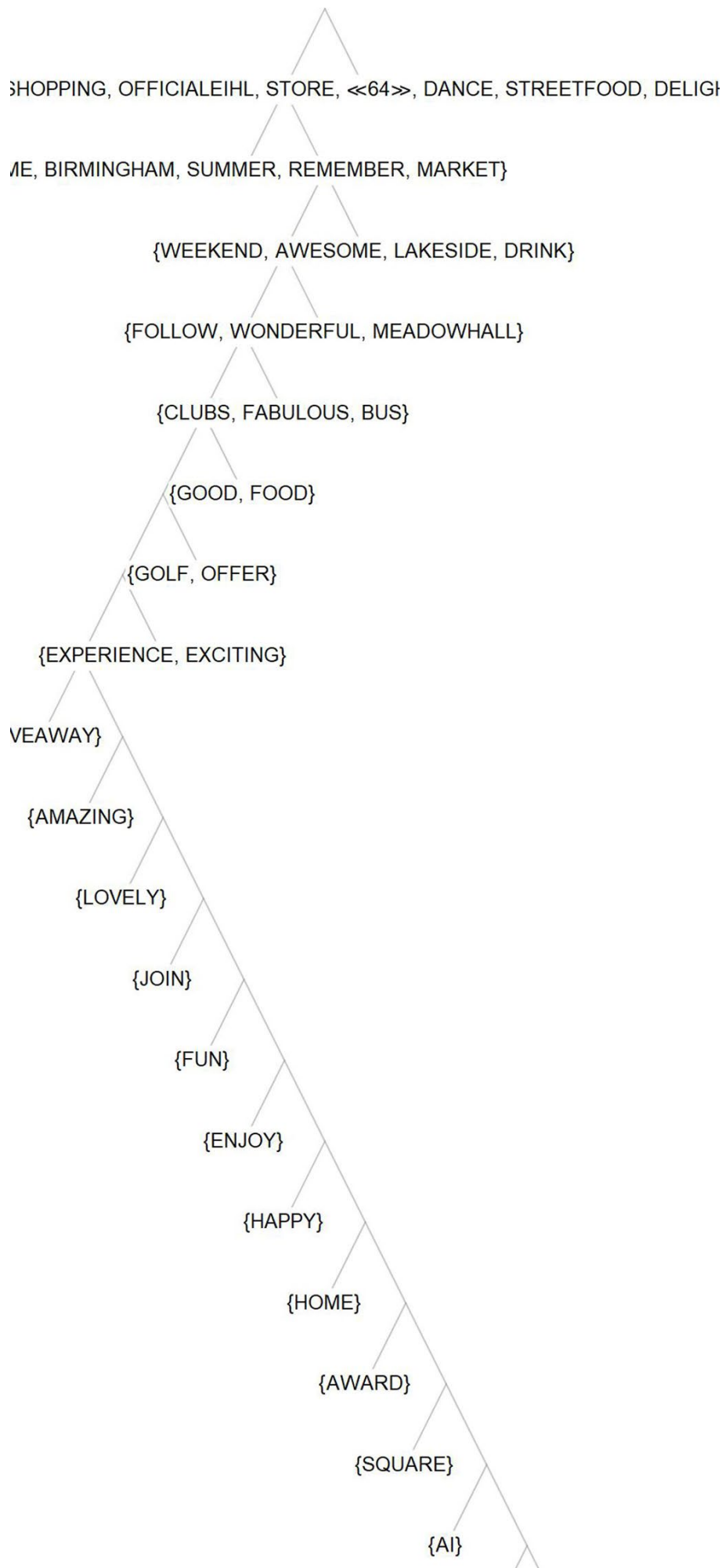
SHOPPING, OFFICIALEIHL, STORE, «64», DANCE, STREETFOOD, DELIGI

ME, BIRMINGHAM, SUMMER, REMEMBER, MARKET}

{WEEKEND, AWESOME, LAKESIDE, DRINK}

{FOLLOW, WONDERFUL, MEADOWHALL}

{CLUBS, FABULOUS, BUS}

{GOOD, FOOD}

{GOLF, OFFER}

{EXPERIENCE, EXCITING}

VEAWAY}

{AMAZING}

{LOVELY}

{JOIN}

{FUN}

{ENJOY}

{HAPPY}

{HOME}

{AWARD}

{SQUARE}

{AI}

Figure 2. The weighted tree from the hierarchical clustering of the clusters as input (hierarchical agglomerative clustering result).

The clusters are: (1) green, stylish, great, shopping, rest, parks, choice, shops; (2), time, city, market; (3) weekend, lakeside, drink; (4) follow; (5) clubs, club; (6) food; (7) golf, offer; (8) experience, exciting; (9) giveaway; (10) amazing; (11) lovely; (12) join; (13) fun; (14) enjoy; (15) happy; (16) home; (17) award; (18) square; (19) AI; (20) Twitter; (21) gift; (23) bag; and (24) app.

Discussion and conclusions

Traditional models of consumer choices of shopping centres have conceptualized this choice problem as a trade-off between the attractiveness of a shopping centre (operationalized by shoppers' evaluations of attributes such as the layout, being a nice place to spend time, quality of the stores and so on) (Dennis et al., 2002b; McGoldrick and Thompson, 1992), and the unattractiveness, that is the cost and inconvenience of reaching the centre, including transportation, distance, availability of parking and so on (Dennis et al., 2002b). The contribution of this paper is that it considers a wider spectrum of factors potentially influencing consumers' choices of shopping centres, not limited to those identified in advance by the researcher and operationalized through specific questions.

Koch (2012), referring to a shopping centre, points out that the language of modernity used by researchers (and the media) is not neutral. In our results of unsolicited consumer language, the terms 'modern' and 'modernity' do not emerge as key concepts. On the other hand, many aspects of the modern world are indeed important in consumers' unsolicited communications, yet largely absent from prior shopping centres research. Such concerns include the attention that consumers pay to green policy (e.g. recyclables), the ability to provide memorable experiences, the presence of leisure facilities like clubs and golf areas, and in particular, modern technology such as artificial intelligence (AI) and mobile apps to assist shoppers before and during their shopping trips. This extended set of influential factors reflects recent developments in the design of shopping malls, characterized by the inclusion of diverse leisure facilities, the emergence of new technologies to enhance the shopping experience and changes in consumers' behaviour as more attention is paid to food quality and green strategies to preserve the planet. Although empirical evidence on the influence of social networks in consumer choice and decision processes has accumulated rapidly in recent years (e.g. Hartmann et al., 2019; Passavanti et al., in press., Walasek, Bhatia, and Brown, 2018), our results emphasize the importance also at the level of the particular shopping centre. Specifically, our findings indicate that consumers see the shopping centre as a leisure and experience destination.

Consumers' spontaneous discussions concerning the presence on social media and especially modern technology are much more evident compared to the traditional size, travel time and price variables reported in previous studies of shopping centres preferences (e.g. Blut, Teller, and Floh, 2018; Calvo-Porral and Levy-Mangin, 2018; Dolega, Pvlis, and Singleton, 2016; Finn and Louviere, 1996; Oppewal et al., 1997; Teller and Reutterer, 2008). Moreover, the results suggest that in choosing shopping centres, consumers are less influenced by traditional retail mix elements, compared to attributes such as the presence of parks, scenic views, and bars. As expected, modern technology that consumers can use to find their location, navigate across shopping malls, and achieve personalized services (such as those provided by various apps) might impact their choice behaviours. Indeed, results of this study indicate that such

technology influences the choices of centres positively, with higher importance than the traditional attributes of shopping centres (attributes that, in the main, did not emerge clearly in the consumers' unsolicited communications). It is concluded that the availability of location, entertainment and navigation technologies (including apps and AI technologies) is important for consumers in the 20 to 40 years age bracket. Thanks to such technologies, consumers who may be unfamiliar with the location of a new shopping centre and its layout, might rely on modern technology. Thus, traditional signage in shopping centres may be less convenient for modern shoppers than activating and consulting an app. Finally, consistent with past studies, findings also confirm the importance of the number, quality and diversity of shops in the choices of shopping centres.

On a conceptual level, Whysall (2011) adapts Berry's (1963) concept of commercial blight to form a new framework for retail decline, adding 'retail management' into components of physical, economic, frictional and functional. We extend the framework to embrace the new dimensions of shopping centre (and town centre) management. What are the implications of these findings for modern shopping centres management? Although this study is to the best of our knowledge the first that has examined a wider set of factors emerging from the analysis of consumers' unsolicited communications, the results of our findings seem to indicate that the structural attributes defining the number and quality of anchor and other highly-regarded stores and location of shopping centres does not define its market potential to such an extent as it did in the past. Other attributes such as (i) the promotion of green initiatives; (ii) the presence of particular areas and views (i.e. parks, lake views, etc.), clubs, bars, and food court; (iii) the availability of particular technologies such as apps and AI; and (iv) and social media channels to directly interact with shopping centre managers and other consumers are gaining in influence. Such considerations can be added into Whysall's (2011) framework of policy considerations for addressing retail and town centre decline.

The results further suggest that spatial research, based, for example, on evaluating the attractiveness and deterrence of shopping centres, might benefit from considering these attributes in future. First, shopping centre managers can influence market shares by considering these structure design variables, while the further availability of leisure components and new technologies would add to the attractiveness of the centre. Specifically, the shopping centre has emerged as a place to relax, where consumers enjoy particular scenic views that should be taken into account when planning new openings. For instance, some shopping centres are considered as destinations in themselves, such as Wafi Mall in Dubai (inspired by ancient Egypt), or the West Edmonton Mall in North America (offering 800 stores distributed in different sections of the mall, each with its own theme).

A noteworthy finding is further related to the availability of cinemas, as an emerging fundamental component of modern shopping centres. However, consumers did not make reference to their willingness to go to cinemas when in the shopping centres, thus managers should consider carefully what leisure components to add, maybe prioritizing bars and clubs as more frequently mentioned by consumers. Thus, detailed analyses of cross use (utilitarian versus hedonic) is required in order to judge which combined retail-leisure complexes add extra benefits. Concerning technology, results seem to imply that retail and mall managers should invest in modern technology like apps, and further social media presence, which can be particularly effective in creating communities.

But what of the wider implications? Results from our sample of shopping centres have relevance to the vitality and viability of town and city centres (indeed, around half of the sample

are located in such centres) and attractiveness attributes of shopping centres also apply to town centres (Teller, 2008). Specific changes may be harder to implement in less-planned agglomerates but there may be implications for town centre managers and for planning policy. Shoppers' perceptions of town centre shopping are slipping under the onslaught of trends towards e-retailing and more localised retailing (Wrigley et al., 2019).

Under the 'town centre first' planning guidance, opportunities for edge-of-centre shopping centres might be neglected (Powe, 2012), yet we know that, contrary to a perception of drawing trade from traditional centres (Teller, 2008), edge-of-centre (and town centre) shopping centres add to the vitality and viability of town centres (DCLG, 2009; Dennis, 2002b; Powe, 2012). In the light of the current difficult environment facing shopping centres (Radojev, 2019; Stevens, 2018), there will be a consequent negative effect on town centres (a 'double whammy', as retail in general is subject to the same negative pressures as are shopping centres (BRC-KPMG, 2019; Mintel, 2018a)).

Similar considerations as for shopping centres also apply to town centres, not least the need to improve perceptions of modernity in terms of attributes such as green policies, social media and AI, and these considerations need to be applied to planning policies. Wrigley at al. (2012) draw attention to the importance to UK planning guidance of linked trips in reinforcing the vitality and viability of town centres (DCLG, 2009: 28, para. 6.2, cited in Wrigley at al., 2012). Refering to relocalisation and linked trips for food shopping, Wrigley at al. (2012) comment on the lack of connection between the real retail world subject to disruptive pressures such as online retailing, the planning regimes, and academic research, such that current practices 'do not deliver vibrant, meaningful town centres' (Wrigley at al., 2012, page 128, quoting Findlay and Sparks, 2017, page 454). Indeed, Findlay and Sparks (2017) point out that issues such as digital disruption tend to be ignored by planners, whereas our results demonstrate that such modern and technological considerations are likely to be critical to the health of shopping centres and consequently town centres. Our current research supports Wrigley at al.'s (2012) contention and answers their call for research to extend the generalizability.

Limitations and future research

Although our research offers a wide-ranging view of the most influencing attributes of modern shopping centres, there are some limitations to be taken into account. Since our preference data of shopping centre attributes emerged in unsolicited consumers' communications, our findings do not estimate consumer preferences quantitatively. Thus, further research is needed to provide a weight to each (new) attribute and compare and contrast with the traditional ones established in the literature, such as those ranked and weighted by Dennis et al. (2002b). Indeed, the current study has only considered observed attributes that spontaneously emerged in consumers' unsolicited communications, so those might be further confirmed through the estimation of a new model of shopping centre choice (i.e. including a portfolio model including a traditional model based on marketing mix attributes, a transport model, and the integration of the new attributes emerging from our analysis).

Moreover, the methodology adopted in this current study involved the collection of consumers' posts shared online through a single platform, Twitter. The inclusion of data collected from other social media (e.g. Instagram), other data such as pictures, and reviews posted by consumers on specialized platforms such as TripAdvisor would enhance the validity and generalizability of the results.

Second, this work is limited in being based on 19 shopping centres in a specific geographic context (UK). Future works might collect larger data sets, also considering shopping centres in other countries for cross-country comparisons. Similarly, the present study did not consider specific retail agglomerations such as town centres or outlet villages; new studies might investigate the most important elements emerging in a wider range of retail settings.

Finally, since the methodology is based on the use of machine learning algorithms provided by *Wolfram Mathematica* and *WordStat*, the percentage of error in analyzing the text is related to advances in computer science and mathematics; comparing results from other software (e.g. *R*) or machine learning algorithms could help to evaluate the reliability of the results.

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