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# Vacant Shops in a Crisis Period – A Morphological Analysis in Portuguese Medium-Sized Cities

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## ABSTRACT

Vacant shops are an important problem affecting urban areas today, particularly in the wake of the economic crisis. Most strategies to analyse and deal with this issue are related to economic and financial variables. However, the amount of research associating store geography and performance with urban morphology has increased over the past decade. Thus, this research tests the hypothesis that specific morphological features characterize vacant retail sites. Using four Portuguese cities as test-beds and Kernel density analysis to plot spatial patterns, vacant shops were for example positively correlated with low segment betweenness and negatively correlated with block area.

## KEYWORDS

Vacant shops; medium-sized cities; urban morphology; space syntax; economic crisis

## 1. Introduction – Crisis and the Study of Vacant Shops

The global economic crisis has severely affected the European countries over the last decade, particularly in the South (Carballo-Cruz, 2011; Dellepiane Avellaneda & Hardiman, 2010; Eichengreen *et al.*, 2014). The recipients of cheap credit for several years, these countries suddenly faced rapidly growing borrowing costs (Bosco & Verney, 2012), the burst of their real estate bubbles (Carballo-Cruz, 2011; Eichengreen *et al.*, 2014), a banking crisis and the implementation of severe austerity measures (Murphy & Scott, 2014), that only recently are being reduced.

The consequences of the crisis in these countries are now being documented in the international literature. These include the aggravation of socio and economic problems related to unemployment and emigration (Cairns *et al.*, 2014), poverty and social exclusion (Frazer & Marlier, 2011), population decline and urban shrinkage (Haase *et al.*, 2014; Saraiva *et al.*, 2016; Sousa & Pinho, 2013), the reduction of levels of quality-of-life and job satisfaction (Anderson *et al.*, 2012; Bell & Blanchflower, 2011; Markovits *et al.*, 2014) and other problems related to housing (Frazer & Marlier, 2011; Cecodhas, 2012) or building dereliction (O'Mahony & Rigney, 2016). Consequently, the global crisis has also led to the slowdown of production, consumption and investment, particularly in southern European countries and in sectors such as retail and real estate (Méndez *et al.*, 2015). In Portugal, Reis (2015) confirms that these were the two sectors most characterized by misallocation, inefficiency and stagnant productivity before and during the crisis years.

Likewise in Europe, whilst consumer confidence declined (Wrigley & Dolega, 2011), major companies experienced a statistically significant decrease in sales (Filbeck *et al.*, 2013), with several multinational brands closing underperforming stores in order to consolidate locations. As well, at local level small retailers have closed their establishments for several reasons, including the declining of the power of purchase of residents, the inability to obtain banking loans or the relocation to more attractive (or simply more affordable) areas (Cowling *et al.*, 2012; Erkip *et al.*, 2014).

These phenomena have aggravated the pressures street shops have suffered in the past couple of decades. A series of macro-environmental and micro-environmental pressure factors have been identified for example by Coca-Stefaniak *et al.* (2005), associated to the transformation of the commercial sector in terms of store types, products sold and selling/buying formats, as well as to various societal transformations. On one hand, traditional storeowners have long been struggling with the competition from big box commercial developments and multi-national brands, gentrification pressures brought about by high rents (and the unfreezing of decades-old leases in downtowns), the technological gap, the absence of policies that can protect and regulate the sector, and the greater vulnerability in adapting to a crisis context (Herbane, 2010; Wrigley & Dolega, 2011; Barata-Salgueiro & Erkip, 2014). On the other, it has been proposed that the traditional store formats can no longer fulfil and satisfy the needs of the postmodern convenience-oriented society (Reimers & Clulow, 2004); a society composed by what Cachinho (2006, 2014) terms the *consumactor*. The consumactor does not shop simply out of necessity, nor at the closest possible place (Rabbanee *et al.*, 2012). Shopping is a complex social practice (Morandi, 2011), an emotional experience where he acts, and thus his behaviour as a shopper, and the patterns he displays have been (re)shaped by socio-economic changes of the new millennium (Vaughan & Valerie, 2009; Hart & Dale, 2014) and by the specificities of different retail environments such as shopping malls (Pine & Gilmore, 1999; Hart *et al.*, 2007; Pecoraro & Uusitalo, 2014).

Consequently, despite various processes associated to downtown retake, commercial-led regeneration and the increase of tourism in Europe which have helped to revitalize downtown areas and commercial streets, street shops still face various perils. These include the loss of character and individuality (Zukin *et al.*, 2009), the expansion of precarious employment in the sector, and the inability to maintain or let establishments, which can also be caused by gentrification pressures for conversion to other land uses (such as local housing for tourists) or the fact that promoters aren't willing to lower rents, preferring to wait (with the spaces unoccupied) for a high-end tenant (Erkip *et al.*, 2014).

The focus of this paper lies precisely on this point: vacant shops. Some authors do argue that vacant shops may actually be healthy for urban areas, if they allow for commercial downtowns to become more compact (Whysall, 2011), if they are a necessary intermediary transition step in the regeneration process (Cachinho, 2014), or if they represent increased competition and economic dynamism in an area, through rapid tenant changing (Katyoka & Wyatt, 2008). But overall, commercial vacancy is seen as having a negative impact on urban areas (Seixas, 2013; EU, 2016), not only in terms of economic performance and the effects associated to building dereliction, but also because local retailers contribute significantly to the preservation of local

communities and the sense of place; that is there is a social need for ‘corner shops’ (Coca-Stefaniak *et al.*, 2005; Pickering *et al.*, 1998; Peston & Ennew, 1998). Thus, recently authors in southern European countries have called attention to the shocking consequences of store abandonment in the configuration, identity and vitality of neighbourhoods. For example, Brázio (2013) presents a striking photojournalistic essay of vacant shops in Portugal, whereas Michou (2013) describes the decline of the famous Athenian arcades in Greece. Such publications have emphasized the need to resume the debate regarding vacant shops in the crisis, and post crisis context, even though this debate is not entirely new to planning research.

Discussed for decades in association to suburbanization, economic downturns, population decline or the competition from large scale commercial formats (Baker, 2002), the literature has approached vacant shops in two ways. First, mainly as an issue of market economics. Vacant shops are seen as a consequence of business lifecycles related to these types of establishments, which are dependent on regional or urban economic systems (the mix and interdependency between businesses), as well as, at an individual scale, firm size, and gender, age and ethnic background of promoters. Second, vacant shops are considered as a variable in the characterization of the vitality of urban areas; a proxy for evaluating the effects of the global recession in domains as social aspects (Hickman, 2013); health and environmental problems (Whysall, 2011); the deterioration of the physical environment (Whysall, 2011; Ferreri, 2015) or other socio-economic constraints (Edmund & Don, 2003; Colin, 2010; Balsas, 2014; Katyoka & Wyatt, 2008; Wrigley & Dolega, 2011). The percentage of vacant shops can be considered as a threshold in itself; Baker and Wood (2010), for example, propose that over 10% of vacant shops is a sign of problems, and more than 20% a sign of significant structural problems. But it has been generally correlated with, again, socio-economic variables as rising unemployment (Gospodini, 2012); homelessness (Michou, 2013); wellbeing and social health (Burns & Willis, 2011; Willis & Burns, 2011); and the lateness of the return of consumers’ and investors’ confidence after economic downturn periods (Whysall, 2011; Ferreri, 2015).

What this means, however, is that vacant shops have hardly been addressed as an issue in themselves, the central variable in their own studies, within planning and regeneration literature. Actually, despite the above mentioned correlations, and despite recent studies addressing methodologies for performing data collection on vacant buildings and derelict sites (Myers & Wyatt, 2004; O’Mahony & Rigney, 2016), vacant shops are ‘notorious hampered by poor statistical information’ (Coca-Stefaniak *et al.*, 2005); a sign, according to the authors, that the sector is seen as insignificant. This comment is very insightful and helps to justify the lack of research that seems to exist focusing particularly on vacant shops. For example, the term ‘vacant shop’ or a synonym hardly appear on the recent special issue on ‘Retail Planning and Urban Resilience’ (Barata-Salgueiro & Erkip, 2014). Notwithstanding the identifiable need for greater levels of information concerning vacant land and property in order to promote urban regeneration and the efficient reuse of existing real estate (Myers & Wyatt, 2004), the attention is rather focused downstream.

Consequently, there is both the need to understand patterns of vacant shops as well as the reasons that may justify them. Yet, authors like Latour (2005) and O’Mahony and Rigney (2016) recall that the evolution of derelict sites cannot be understood by market

forces or aesthetic concerns alone; they are the outcome of interactions between a range of urban actors and variables, which change with time or location (Baker & Wood, 2010). This means that although the logics of the economic market should still explain great part of the geo-economic trends of the commercial sector; urban planning, and the intrinsic characteristics of the sites themselves – their morphology – should not be neglected. In fact, environmental design and urban morphology have recognizably help explain other phenomena such as criminal hot-spots (Weisburd *et al.*, 2012; Summers & Johnson, 2016) or movement patterns (see Hillier *et al.*, 1993, and other works on Space Syntax), both of which can be otherwise majorly explained by social and economic factors. Therefore, urban morphology can also help understand the patterns of vacant shops, particularly as in the last decade, the amount of research associating store geography and performance with morphology and urban form has significantly increased (see next section). A particular retail environment may strongly contribute to increase the resilience and vitality of a certain urban area; but an unsuitable urban environment may also, to some extent, contribute to the lack of success, or the inoccupation, of a store space, notwithstanding other social and economic justifications.

Accordingly, this paper tests a straightforward research question: are specific morphological features characteristic of vacant retail sites, and hence may help justify them? The problem of vacant shop data availability is overcome by using a complete georeferenced dataset for four Portuguese cities during the crisis period, derived from a large-scale survey. This dataset is then the object of a statistical pattern comparison with specific morphological features. In Section 2 a review is made of studies focusing on the relationships between commerce and urban morphology, to further contextualize the themes of this research and emphasize the lack of research on vacant shops. Sections 3 and 4 present respectively the methodology and the study areas within Portugal. In Sections 5, vacant shop data is tested against morphological data, and in Section 6 conclusions are drawn.

## 2. The Relationship between Commerce and Urban Morphology

For decades, commerce was considered to be just a consequence of the city's economic market conditions, demography and consumer behaviour patterns (Borchert, 1998). Retailers, following the principles of the retail location theory (Mendes & Themido, 2004; Reynolds, 2005; Yrigoyen & Otero, 1998), chose the best location they could afford that was closest-to-market and where the consumer catchment area would be maximized. Changes in the market and demographics implied a relocation of commercial geographies. It was not assumed that the commercial mix itself could be the cause of shifts in the value of locations.

Therefore, although overall retailers still follow the century-old dogmas of '*location, location, location*' (Taneja, 1999) and '*the site makes the shop*' (Grocery, 1932, *cit in* Alexander *et al.*, 1999), and retail location models still focus primarily on demographics and competition in relation to location (Roig-Tierno *et al.*, 2013); two things have changed, particularly in the past two decades. First, commercial activity has been recognized as an important catalyst for urban regeneration and revitalization. In the words of Beyard (2009), commerce does not simply follow rooftops, as previously assumed; it can also follow the anticipation of future rooftops (Beyard, 2009). That is,

it can produce sufficient attractiveness to make, or re-generate the city, because it directly influences, for example market prices of surrounding residential areas (Haugen, 2011), or can be a determining factor in the choices of where to live, where to socialize, and how to travel on a daily basis (Christian *et al.*, 2011; Manaugh & Kreider, 2013; McConville *et al.*, 2011). Thus, urban regeneration through retail oriented policies has been proven to have a very positive effect in the quality, vitality and resilience of city areas (Lowe, 2005; Emery, 2006; Findlay & Sparks, 2009; Procopiuck & Djalo, 2008; Brunetta & Caldarice, 2014; Barata-Salgueiro & Erkip, 2014), even outside the city centre (Bolton & Vaughan, 2014) and even when facing the shock wave of the global economic crisis (Wrigley & Dolega, 2011). In the words of Lowe (2005), such place building has become entwined in current revisions of retail planning policy.

Second, the notion of what exactly constitutes the ‘best location’ for a store has changed (Saraiva & Pinho, 2017). Being close-to-market is of course still important, but there are other relevant factors to be considered. If shopping has become an experience, stores have become the vehicles for that experience. The degree of attractiveness of a store, or the loyalty to it, is not solely dependent of location and may even be unaffected by it (Rabbanee *et al.*, 2012). It has shifted with the evolution in store layouts, the types of products sold and the way they are presented, marketing strategies and the multiplicity of purchase and payment options (Saraiva, 2013). But it has also changed with the intrinsic composition of each retail environment and its relationship to the city. Over 20 years ago, Axenov *et al.* (1997) demonstrated that urban environment conditions, including urban morphology and transportation patterns, had turned into the major group of variables that shape the retail trade system. A little later, for example Brown (1999) showed how store popularity changed with location within the physical layout of a shopping mall. Location was now perceived as much more than a mere physical place. It included the concept of accessibility. It included the built landscape. It included layout and environmental design. That is, it included the notion of morphology (Saraiva, 2013).

Together, these two changes brought about a new wave of research concerning the relationship between commercial activity and the form and structure of cities. This relationship, which Saraiva (2013) termed the ‘morphological sense of commerce’, is however, according to a number of authors, still consensually absent and unrecognized in scientific research, urban regeneration and policy making (Balsas, 2001; Sarma, 2006; Grant & Perrott, 2011; Musso, 2011; Villain, 2011; Saraiva & Pinho, 2017). Consequently, only a handful of authors have tried to go beyond the analysis of commercial distribution patterns in comparison with socio-economic densities (as done for example by Joosten & Van Nes, 2005; Kompil & Celik, 2006; Smith, 2007) to encompass morphological patterns that may present justifications for the changing configurations of commercial hierarchies (Saraiva & Pinho, 2017) along with the very (socio-economic) nature of commercial environments.

Early works saw Barke (1998), in interior Spain, analyse window size, building type and occupation, and the existence of storage facilities. The author noted distinct morphological characteristics, highly inter-correlated, in buildings with only commercial use. These buildings were also more correlated with the catchment area population than that of the store’s immediate area. Later, Yoshida and Omae (2005) distinctly

associated Tokyo commercial blocks to larger areas, volumes and building-to-land ratios. For Jostens and Van Nes (2005), Berlin stores tended to full block typologies, preferably of smaller size, characterized by high floor space index and build up street sides. Shops would also be located in medium-density zones usually near main junctions or along main streets. According to the authors only chain stores and shopping centres occupied non-block typologies.

On the other hand, Saraiva (2013) questioned this allocation of specific, non-changeable, morphological features to all commercial spaces. The author acknowledges that some overall characteristics are common, such as the fact that stores are generally located on the larger side of medium-to-large sized blocks. However, the author notes, most commercial variables, particularly in the city centres, have even distributions between the various types of buildings and blocks. Only when analysing particular types of activities do morphological/land-use distinctions are made clear. For example, commercial services such as real estate agencies, generally seek buildings with other services, and 80–90% of all fashion stores are located in few, central, main streets. Consequently, the author proposes that each store type is conditioned by specific morphological properties, and thus its success may also be conditioned by urban and land-use hierarchies, building distribution, the configuration of localities (see also Wrigley & Dolega, 2011), as well as the way city areas are connected (Saraiva, 2013).

This last point has been the most explored in the literature, with several authors comparing commercial patterns with transport/accessibility configurations at various scales (Marques, 2003; Joosten & Van Nes, 2005; Jingnan, 2009; Villain, 2011) and network analyses including Space Syntax (Hossain, 1999; Van Nes, 2001, 2005; Joosten & Van Nes, 2005; Sarma, 2006; Porta *et al.*, 2009; Villain, 2011; Griffiths *et al.*, 2013; Wang *et al.*, 2014). According to Hillier and Iida (2005), activities that depend on movement will follow the grid's logic, and there will be a gradation according to the necessities of each particular activity. In these types of analyses, morphological elements are generally characterized through connectivity, either distance to closest intersections (Villain, 2011), or the weight of the store's street segment in the network, according to the concepts of 'integration' (related to centrality in the network) and 'choice' (related to betweenness).

Jingnan (2009), using segment analysis in Chinese cities, concluded that cities' commercial centres exactly corresponded to cities' syntax centres, both at a local and a global scale, and that almost all large-scale stores were directly located within sub-local syntax centres, in places connected to major thoroughfares and bus routes. Likewise, for Van Nes (2001, 2005) shopping areas in the Netherlands were only successful if they were among the highest integrated streets, and the higher the density of streets in the vicinity, the more intense the shopping street in terms of number, size and variety of shops. Yet the same author, in Berlin, found a weak co-occurrence between integration and the presence of shops (Joosten & Van Nes, 2005) and Porta *et al.* (2009), working in Italy, argued that the strongest correlation occurred with global betweenness rather than with integration.

Again, some authors believe that these conclusions are not entirely true for all cities and all types of activity – the 'gradation' Hillier had already hinted to. Sarma (2006), Hossain (1999), Villain (2011) and Wang *et al.* (2014), working in, respectively, India, Bangladesh, Canada and China, agree that commercial spaces whose sales (movement)

are generated by their own attracting potentialities (anchor or specialized stores) have the tendency to be clustered together in central locations, although surviving in isolation. On the other hand, functions whose movement is just attracted coincidentally, like convenience and multi-purpose shopping, because they are more affected by competition and movement, are more dispersed, although in spatially strategic locations with high through-movement potential and serving local catchment areas. Only first necessity and some convenience stores appear to be a global phenomenon in the market, correlating both globally and locally with through-movement. This leads Sarma (2006) to conclude that distance is directly proportional to social and economic class in terms of movement and in terms of shops.

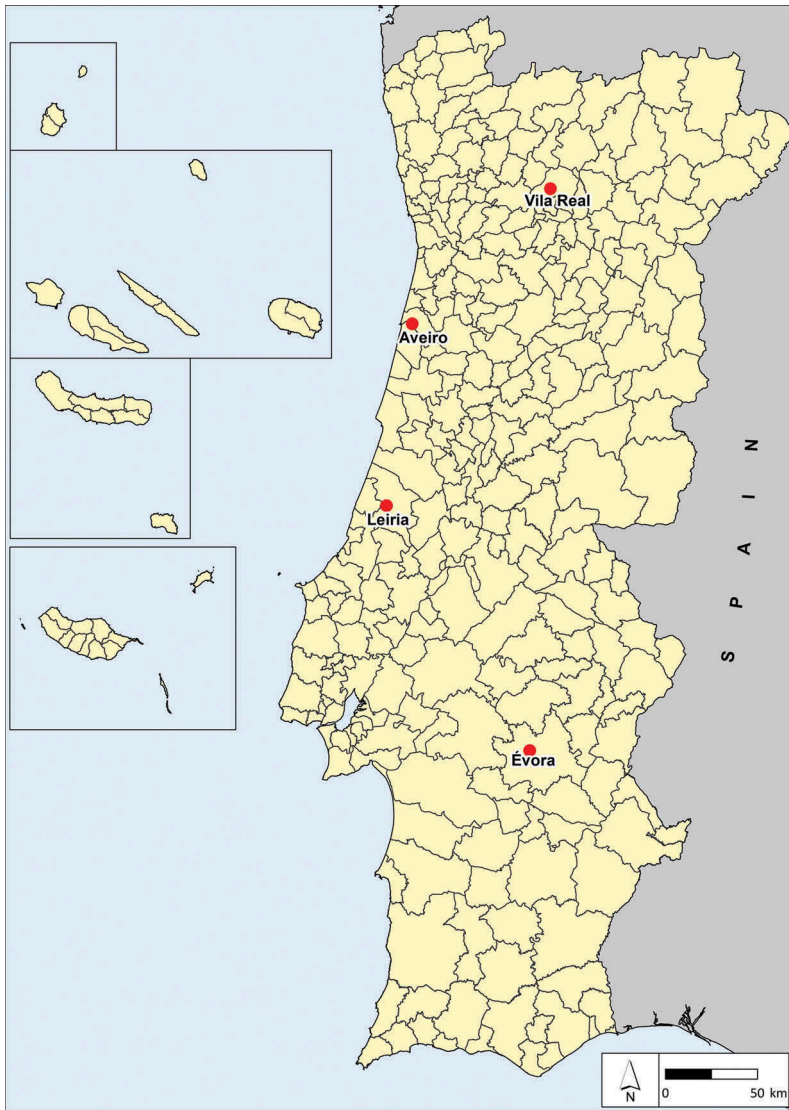
There are two elements that can be criticized in these studies. The first is that most have been carried out in the central areas of larger cities, with only a pair of authors calling attention to the fact that conclusions cannot be extrapolated to smaller areas, because the urban and commercial structures are different. Teklenburg *et al.* (1994), analysing Dutch suburbia, discovered that although the busiest shopping street was one of the most integrated lines of the axial map, other commercial streets or department store locations were not. The authors established that in most cases where the most integrated lines for pedestrians did not coincide with the major store locations there was a co-occurrence of pedestrian and intense vehicular traffic. Likewise, Saraiva (2013) questions the statement that comparison or occasional shopping do not correlate with through-movement. This may be true for city centres, but in peripheries comparison-type stores are suitable for both thoroughfares and segregated out-of-the-way areas. As well, single-purchase stores, because they require space and have a strong intrinsic attraction potential, can locate outside the most central areas. In city centres, multi-purpose and multi-comparison stores may have a predilection for the most central lines, but first necessity stores may also drift towards segregated (residential) neighbourhoods. The second critique is that these studies correlate morphological elements with functioning store spaces. Data collection is based on stores open for the public and it is assumed that the correlations found establish the variables of preference for successful retail sites.

There is therefore the dual need to test these methodologies not only on smaller cities, hardly the object of attention, as well as on vacant, rather than occupied, commercial sites, to test whether previously made assumptions are true. This is even more important because smaller or peripheral cities, especially those farther away from larger urban areas, have been significantly more affected by the economic crisis (Dijkstra *et al.*, 2015) and hence the patterns of vacancy may be more acute.

### 3. Methodology

To test the research hypothesis two major elements had to be collected: commercial and morphological data. The dataset used was the same as that introduced in Saraiva and Pinho (2017), concerning four Portuguese medium-sized cities: Vila Real, Aveiro, Leiria and Évora (Figure 1). The decision to use these four cities derived first, from the need to produce scientific research related to this issue on smaller cities and peripheral areas; second, from the need to obtain, in order to test the hypothesis, complete commercial and morphological information at city scale in





**Figure 1.** Location of the case study cities in Portugal.

different case studies, something that would be less feasible in major cities like Lisbon or Porto. Furthermore, medium-sized cities in peripheral European countries like Portugal have only in the last decade become the object of interest by large scale developers and commercial companies, once the markets around the main city's conurbations became saturated. Therefore, these urban areas balance traditional commercial hierarchies, with the slow penetration of modern and large scale formats, thus becoming good testbeds for urban commercial policies. Moreover, the role of medium-sized cities in the urban network has increased. Although many interior cities and regions have been facing for some time low economic, social and cultural periods, and are pressured by globalizing forces and strong regional competition (Marques Da Costa, 2002; Kunzmann, 2010), they have also never been mere

miniature reproductions of larger conglomerates (Ferrão, 1995). They generally offer greater quality of life, affording opportunities for firms and individuals, and have grown to become critical nodes in national economies, particularly as the debates regarding polycentrism and territorial cohesion increase (Clayton & Morris, 2010; Marques *et al.*, 2018a, 2018b). In this sense, medium-sized cities are aiming to combat population loss and the effects of the recession, such as struggling businesses, by re-inventing themselves as places of opportunity, innovation and specialization, in order to find, in the words of Kunzmann (2010): ‘their own profile between international orientation and local embeddedness’.

The four cities were selected so as to cover distinct regions of Portugal; littoral and inland, North and South. All four have been considered as important regional centres in their respective region in the recent territorial model presented by Portugal’s National Plan for Territorial Planning Policies (revised in 2018). Their number of inhabitants ranges from 30,000 (Vila Real) to 50,000 (Leiria), and they have had different degrees of permeability to modern commercial formats. For example, Évora’s large scale shopping mall only recently opened in 2017, whereas Vila Real’s had opened in 2004. The survey data used for this study was collected during Portugal’s severe economic crisis at periods in 2012–2013, as part of a greater research project about the urban and commercial patterns of Portuguese medium-sized cities (Saraiva & Pinho, 2017; Saraiva, 2013). Data collection consisted on a store-by-store survey performed *in situ* at each of the four cities, which took a year to complete, based on predetermined morphological and commercial variables.

The case study area of each city was defined by the limits of the urban perimeter created by each municipality in their respective municipal plans. This area was further divided by the research team in two parts, corresponding to a ‘city centre’ and a ‘periphery’. The city centre was considered to be the historical city nucleus, defined by administrative divisions (centre parishes according to municipal data), historical or natural landmarks (such as the Roman city walls in Évora or the river Lis in Leiria) and other visual, physical, structural or psychological barriers (such as the IP4 motorway in Vila Real). The periphery was considered to be the remaining area within the urban perimeter.

Morphological data selected follows the major principles of previous studies. The three principles presented by Moudon (1997): form, resolution and time; mean that morphology is not just the study of form. It is the study of form and function over time. Interestingly, Baker and Wood (2010) discuss three dimensions of vacancy which are somewhat overlapping: dimension, location and time. Furthermore, Moudon (1997), Karaman (2001) and Whitehand (2001), (2007) subdivide the elements of morphology as being related to typology (spatial distribution and settlement patterns), building fabric and typology (land and building use), whereas Cannigia and Maffei (1993) describe various spatial levels (street, neighbourhood and territorial) over time.

Consequently, street segments was catalogued according to width, state of conservation, type of traffic (exclusively pedestrian or not), with Space Syntax<sup>1</sup> being used, as in previous studies (Hossain, 1999; Van Nes, 2001, 2005; Joosten & Van Nes, 2005; Sarma, 2006; Porta *et al.*, 2009; Villain, 2011; Griffiths *et al.*, 2013) to determine the configuration of the grid and estimate the amount of movement. In most medium-sized cities of Portugal, the majority of movements are made using individual motorized transport,

a use that increases with the increase in monthly income and professional status (Bento *et al.*, 2015). The alternative is generally walking, as these cities don't have public transports such as metro and possess only a very simple bus network. Hence analysis like proximity of vacant shops to closest public transport stops wouldn't be much relevant. According to Space Syntax literature, however (Hillier & Vaughan, 2007), 60–80% of movement flows can be accounted by the configuration of the grid. Following Saraiva (2013), the two main Space Syntax measures; 'integration' (affinity for to-movement) and 'choice' (affinity for through-movement) were calculated for 16 different radii (in meters),<sup>2</sup> and the results were divided into six quantiles (using Jenks' Natural Breaks), ranging from the most central (first) to the most segregated (sixth). Each store was associated to the street segment closest to its main door.

Blocks were characterized according to a typology ranging from full to hollow (Joosten & Van Nes, 2005), their area, land-use mix, resident and dwelling data, and a set of distances (between built elements, stores and store types). Buildings were characterized according to use, height, area and volume, as well as style, state of preservation and age (Barke, 1998; Yoshida & Omae, 2005). In the absence of recent comparable datasets for building age in the four cities, temporal information was derived from Domingues (2006), which establishes two time frames for Portuguese medium-sized cities: before and after 1975. This post-revolutionary year is nonetheless relevant, as it is associated with the construction booming that was particularly evident in the last quarter of the century throughout Portugal.

Commercial data consisted on a complete physical store description, including name, type of activity, type of ownership, area, other uses within the same building and if the space was occupied or vacant. Vacant shops were further classified as closed or empty. Closed shops are those not open to the public, but have not (yet) abandoned the space they previously occupied. Many still maintain billboards outside and visible products on the inside, but have closed due to licencing, health or financial problems. Empty shops, on the other hand, are fully vacant and completely deprived of content, either because the previous occupants have left, or because the space has never been occupied at all since construction.

Overall, around 8000 individual store spaces were catalogued and georeferenced in the four cities. Of these 1312, an astounding 17%, were vacant. Spatial analyses were made using ArcGIS software. Besides the computation of the direct associations between shops, buildings, street segments and blocks (e.g. shops per street segment type), further distributional patterns have been plotted using Kernel density estimation (KDE) heat maps (previously used on retail patterns by, for example Porta *et al.*, 2009; Jansenberger & Staufer-Steinnocher, 2004; Wang *et al.*, 2014; Porta *et al.*, 2011). KDE is an interpolation technique in spatial point pattern analysis providing density estimates for subsets of the study area that can overlap. In this case a 20-meter cell size has been used, in order to capture the finer street scale (for example Wang *et al.* (2014) use a 100-meter cell size). Jansenberger and Staufer-Steinnocher (2004) denote the success of this method in describing small scale local changes. Values obtained from the KDE for all variables using the same raster matrix allow for correlation analysis between them. Unlike previous research that correlate store location with street centrality (Porta *et al.*, 2011, 2009; Wang *et al.*, 2014), we have extended this methodology (considering vacant shop location) to other morphological variables such as building density,

building height and building age density, or block area. Of the 16 radii analysed, five representative of the various scales ( $r = 500$ ;  $r = 1250$ ;  $r = 3000$ ;  $r = 5000$ ;  $r = n$ ) were selected for the correlation analysis presented here. The Pearson correlation coefficient was obtained using SPSS software.

## 4. Overview of the Portuguese Case Study

### 4.1. The Commercial and Crisis Context

As Saraiva and Pinho (2017) note, the Portuguese commercial sector is peculiar, because it balances a strong traditional commercial heritage in historical contexts (downtowns several centuries old) with an above average acceptance of large-scale establishments. This once ‘nation of small retailers’ (ODC, 1999) witnessed a ‘commercial revolution’ (Cachinho, 1994) in the 1990s, and from then on maintained this duality in the sector. In 2009, only four countries (all in Eastern Europe) witnessed a greater increase of shopping centre area than Portugal (Cushman & Wakefield, 2009) and by the start of this decade, a total of 153,000 companies worked in retail (INE, 2011b). Most are family enterprises with limited social capital, as there are only 3000 units of relevant dimension (as specified by Decree-Law 218/97 of August the 20th) (INE, 2011b). The around 100 large-scale shopping malls the country has today, cover a total area of 3.4 million square meters and can easily house simultaneously the entire 10 million inhabitants of the country (Saraiva, 2013).

Geographically, in the early 2000s, more than half of the country’s commercial enterprises were located in the metropolitan areas of Lisbon and Porto (ODC, 2001; INE, 2004). Smaller cities witnessed a spiral of decline, a consequence of rural exodus and poor economic conditions. Melo *et al.* (2001) named these, as well as a low car-usage tradition and activity and job concentration (mostly dependent on the State), as reasons for the lack of commercial investment in these locations. However, the saturation of the markets of Lisbon and Porto and the pressure exerted by multinational commercial distributors led to the commercial modernization of smaller cities from the mid-2000s onwards (GECIC, 2005). This was aided by a series of commercial urbanism projects, aimed at revitalizing downtown retail, sponsored by European structural funds (Saraiva, 2013).

Portugal, however, is a country where the absence of strong commercial legislation has led to a somewhat profuse dispersion of shops. In the 1980s the motto was an ‘open where you want’ policy (Fernandes & Chamusca, 2014), to which real-estate developers quickly adhered to. The 1990s Municipal Plans further promoted the assumption that retail distribution was a consequence of urbanization (Fernandes, 2009), by stipulating that buildings of a certain size, regardless of location, had to contain a space for a shop on the ground floor. Only large scale establishments (over 2000 m<sup>2</sup>) have been subject to a tighter control in terms of size, and, according to a recent law-decree (Decree-Law 21/2009 of January the 19th), of a ‘*proper spatial insertion*’ and of a ‘*multiplicity of commercial offer and the diversity of supply*’ (Fernandes *et al.*, 2000; Saraiva, 2013).

With the period of real-estate expansion and speculation in the 1990s, and with the proliferation of suburban residential areas (often with rows of retail on the ground floors) this meant an inevitable excess of commercial offer and an overt dispersion of

commercial patterns (Saraiva & Pinho, 2017). Then, in the late 2000s, Portugal was severely affected by the economic crisis. The weak growth of the previous decade had become negative in 2003, and unemployment as well as public debt increased (Bosco & Verney, 2012; Torres, 2009), whilst austerity policies started to be implemented (Bosco & Verney, 2012). However, until 2008 when the global crisis reached Portugal, the country still had high transaction rates of real estate, fuelled by easy-to-obtain banking credit (Whitehead *et al.*, 2014; Matos, 2012). A period of stagnation and recession ensued, characterized by a large external debt, a very high level of indebtedness of the private sector, a continuous rise in unemployment and job insecurity, and a concentration in exposure to the real-estate sector (Torres, 2009; Cairns *et al.*, 2014; Carneiro *et al.*, 2014). Particularly, real-estate and retail were most affected (Bosco & Verney, 2012; Reis, 2015) with the decline in transactions, rent values and supply exceeding demand (Whitehead *et al.*, 2014; Matos, 2012).

The commercial rent laws have also been a constant object of debate that arguably may justify this decline. Some authors state that the existence of outdated rent laws make it extremely difficult for new promoters to break into historical city centre markets and hence enact downtown commercial regeneration (Cushman & Wakefield, 2006). Others argue that much can be attributed to the new rent laws, which have been updating, according to the inflation, the decades-long rent values in historical areas, and removing the iron-clad contracts of leaseholders. By giving more freedom to landlords, these new laws have facilitated the gentrification of older store proprietors, unable to cope with the added expenses, on top of competition, the crisis and declining consumption (Brázio, 2013; Expresso, 2014). Precisely, in mid-2016, under pressure from Commercial Associations, the Portuguese parliament has approved another project bill that prohibits the rise in rents and evictions of particular shops in specific historical areas of city centres (155/XIII of April 2016).

Regardless, the number of vacant shops, according to the very scarce available information (mostly for Lisbon and Porto), is clear and overwhelming. At a commercial convention in 2005, it was estimated that 13 thousand shops of traditional independent retail had already gone out of business (Nielsen, 2005). In 2013, the Union of Commercial Associations estimated that, from January to September of that year, 1320 shops had closed in Lisbon and 792 in Porto (Expresso, 2014), and another source claimed that in the following year, six shops a day were closing in Porto (Indymedia, 2014). Many newspaper articles discuss vacant shops in Portuguese downtowns, but there does not seem to be a scientific study in Portugal that ascertains and analyses their amount.

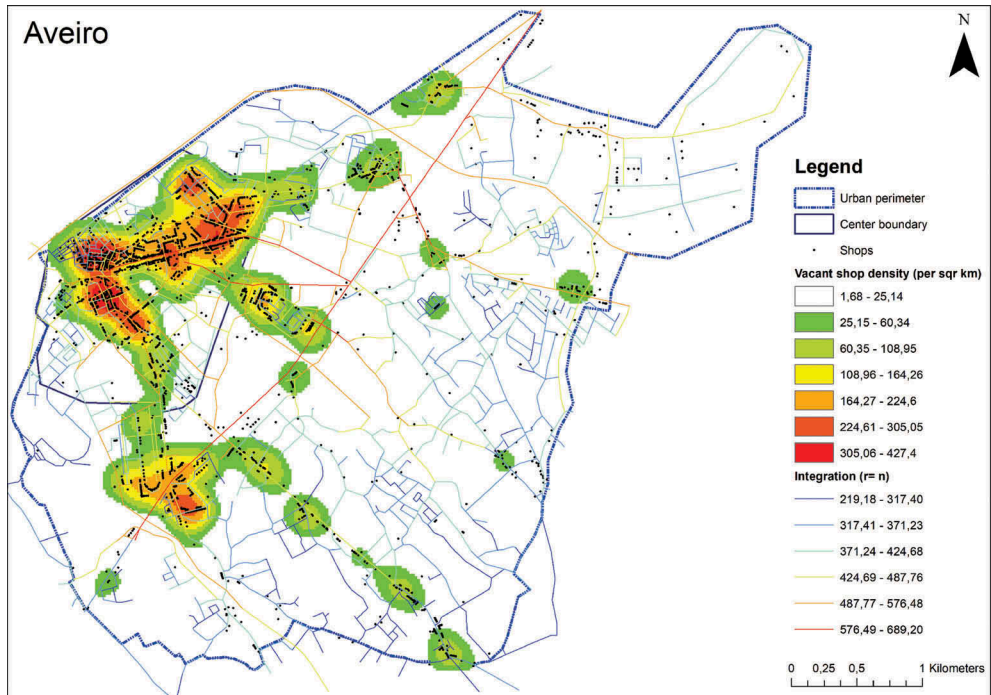
#### **4.2. Brief Contextualization of the Four Case Studies**

A little more than half a century ago, each of the four selected cities (Vila Real, Aveiro, Leiria and Évora) was a small locality composed of a historical city centre and a minor surrounding area. Only since then have the official limits of these cities expanded, in order to slowly engulf growing surrounding localities that once were either small satellite villages or rural fields. In fact, these four cities are still growing. According to the last two population Census (INE, 2001, 2011a) all the cities have grown in terms of population, number of families, buildings and homes, in this 10-year period.

**Table 1.** Characterizing vacant shop data of the four case studies.

Cities		Vila Real	Aveiro	Leiria	Évora
Resident population in 2011 Census	<b>City</b> (% Centre)	<b>30.207</b> (40%)	<b>40.860</b> (20%)	<b>50.455</b> (25%)	<b>41.846</b> (11%)
Total number of available shop spaces	<b>City</b> (% centre)	<b>1.397</b> (68%)	<b>2.221</b> (57%)	<b>2.505</b> (56%)	<b>1.735</b> (48%)
Vacant shops	<b>City</b> (% centre)	<b>129</b> (81%)	<b>402</b> (57%)	<b>512</b> (55%)	<b>266</b> (40%)
% of Vacant (empty) shops in total number of shops	<b>City</b>	<b>9% (3%)</b>	<b>18% (15%)</b>	<b>20% (14%)</b>	<b>15% (9%)</b>
	City Centre	11% (4%)	18% (15%)	20% (13%)	13% (6%)
	Periphery	6% (2%)	18% (15%)	21% (15%)	18% (12%)
% of Vacant shops in post 1975 buildings	<b>City</b>	<b>60,6%</b>	<b>50,6%</b>	<b>72,2%</b>	<b>50,9%</b>
	Centre/Periphery	62%/54%	31%/77%	67%/79%	2%/85%
Vacant shops per area in km <sup>2</sup>	<b>City</b>	<b>5</b>	<b>23</b>	<b>14</b>	<b>20</b>
	Centre/Periphery	34/1	96/13	73/9	100/13
Inhabitants per vacant shop	<b>City</b>	<b>234</b>	<b>101</b>	<b>99</b>	<b>158</b>
	Centre/Periphery	114/758	52/164	45/163	44/235
Buildings per vacant shop	<b>City</b>	<b>58</b>	<b>21</b>	<b>20</b>	<b>52</b>
	Centre/Periphery	21/216	11/34	7/35	29/67
Vacant shops per block with shops	<b>City</b>	<b>0,6</b>	<b>1,1</b>	<b>1,2</b>	<b>0,6</b>
	Centre/Periphery	1,1/0,2	1,5/0,9	1,6/0,9	0,6/0,6

The total number of store spaces varies from around 1400 in Vila Real to 2500 in Leiria (Table 1, Figure 2). About half of these stores are in the boundary delimited as the ‘city centre’, which comprise only around 10% of the city area. Vila Real is the most centre-dependant city, with 40% of the population and 70% of stores within the centre boundaries. Évora is the smallest, with a city centre classified as an UNESCO world heritage site where


**Figure 2.** Shop location, vacant shop density and segment integration in the cities of Aveiro, Évora, Leiria and Vila Real.

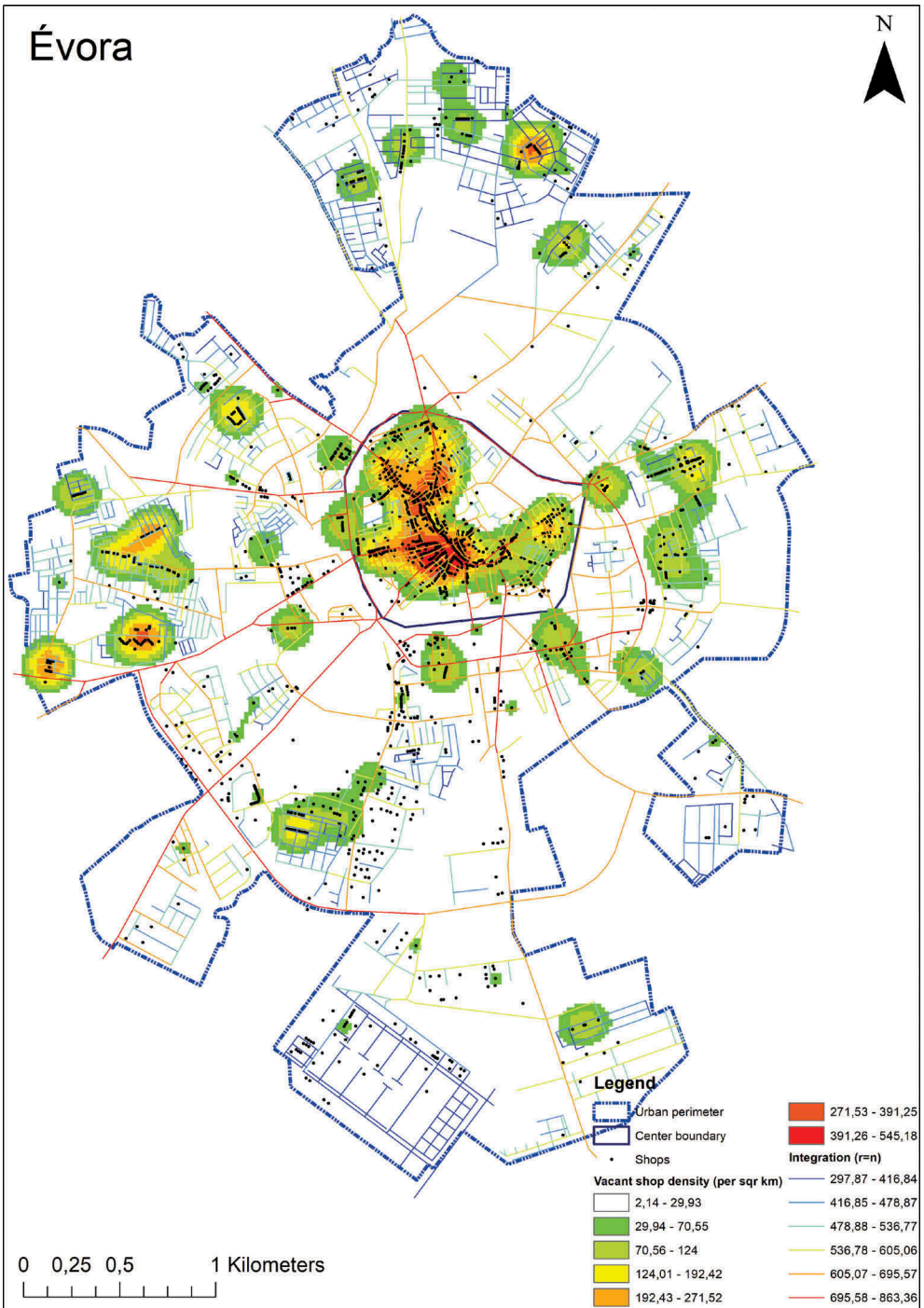


Figure 2. (Continued).

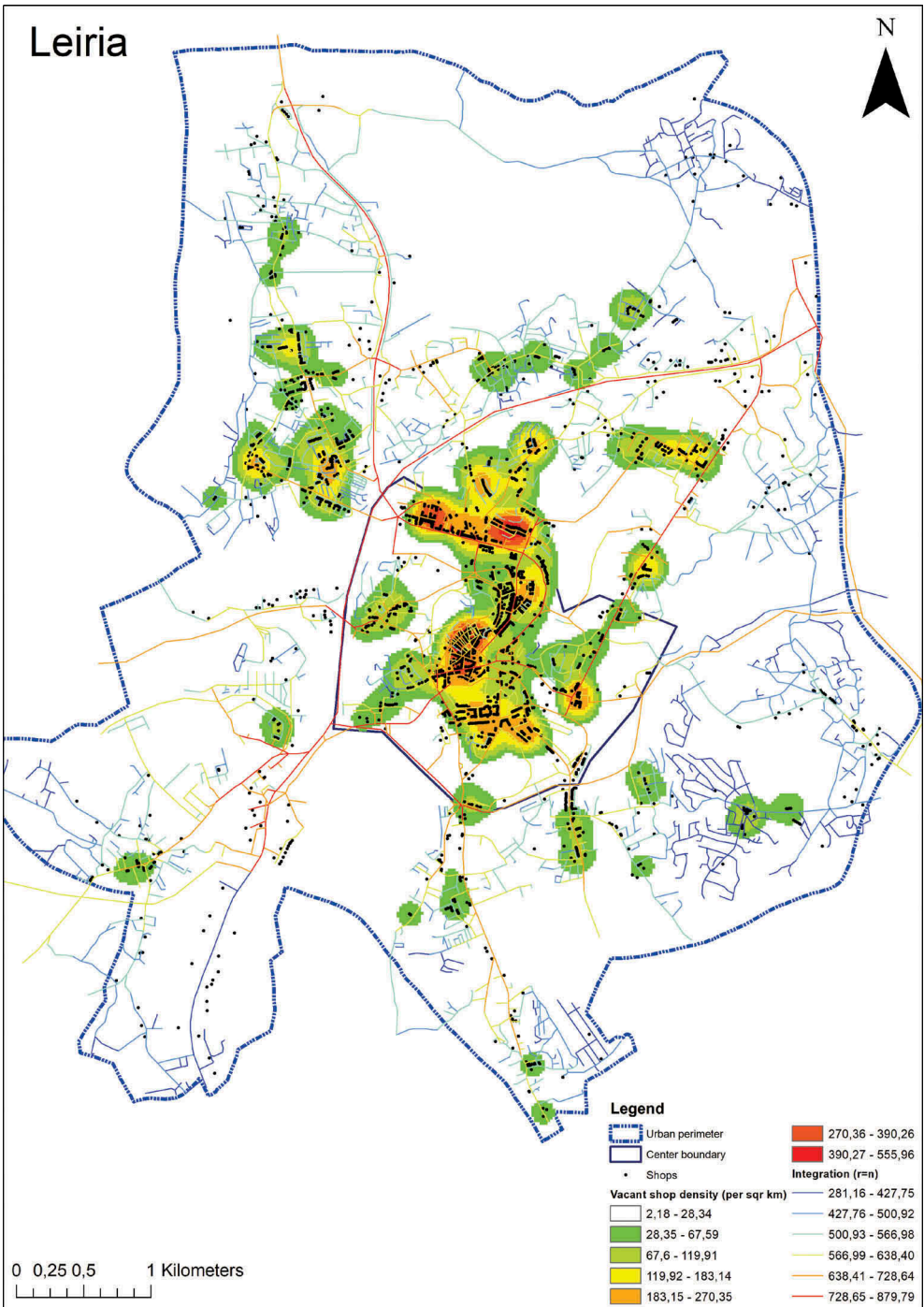


Figure 2. (Continued).



## Vila Real

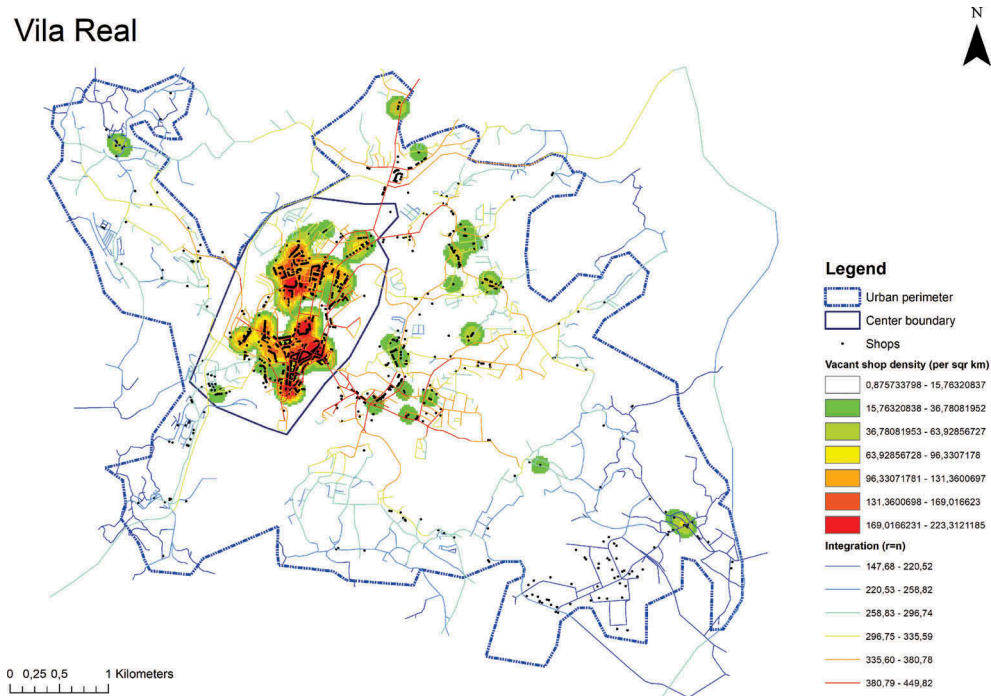


Figure 2. (Continued).

construction in height is restricted. Vila Real and Leiria's peripheries are composed of several interconnected localities (former satellite villages) that have become part of the official city limits in the last decades, and therefore possess local centrality structures. Aveiro's and Évora's peripheries, on the other hand, are structured in an edge-road logic; along and around expansion axes that are directly connected to the city centre.

Previously, Saraiva and Pinho (2017) found that all four cities have practically the same number of shops per inhabitant ( $\sim 0.04$ ), per block ( $\sim 6$ ) per building ( $\sim 0.2$ ), and per distance from the city centre, as well as relatively similar percentages of the different activity types; 20–40% of first necessity stores; 8% of second necessity stores (such as banks or bookstores); 15% of multi-comparison stores (like fashion or telecommunication stores); 25% of comparison stores (such as home or car-related stores); 7% of single purchase stores. This reaffirms the possibility of an intrinsic connection between urban morphology and commerce. The description of open store patterns and hierarchies falls out of the range of this paper and can be found in Saraiva and Pinho (2017).

## 5. The Morphological Pattern of Vacant Shops

### 5.1 Analysing the City as a Whole

As Table 1 displays, there are between 9% (Vila Real) to 20% (Leiria) of vacant shops in these cities, numbers which clearly pass the threshold of viability defined by Baker and Wood (2010). The majority are 'empty' (i.e. fully vacant), in all cities except Vila Real.

Interestingly, the number of ‘closed’ shops (i.e. signs of previous occupation are still visible), is the same in three of the four cities: 6% of the total amount of shop spaces available.

Vacant shops are primarily in the city centres. Only Évora presents a value below 55%, whereas Vila Real has over 80% of the city’s vacant shops in its city centre. Between 50–70% of the city’s vacant shops are located in buildings constructed after 1975, being that this number is above 75% in all peripheries but Vila Real’s. Further indicators show that Aveiro and Leiria, the cities with the greatest number of shops, have a close affinity in terms of inhabitants per vacant shop (~100), buildings per vacant shop (~20) and vacant shops per blocks with shops (~1.2). The other two cities, Vila Real and Évora, also share similarities in the number of buildings per vacant shop (~55) and vacant shops per blocks with shops (~0.6). These similarities are maintained when the centre or the periphery are considered individually (Table 1). Furthermore, most vacant shops are located in commercial rows (adjacent to other shop spaces) on the ground floors of buildings with an average of four floors, mostly with homes and sometimes services on the upper floors (Table 2). In Évora average building heights are slightly lower, as was to be expected.

**Table 2.** Characterizing data of buildings containing vacant shops.

Cities		Vila Real			Aveiro			Leiria			Évora		
		N	M	SD	N	M	SD	N	M	SD	N	M	SD
Number of floors of buildings with vacant shops	<b>City</b>	129	<b>4.5</b>	<b>2.2</b>	<b>402</b>	<b>4.2</b>	<b>2.2</b>	<b>512</b>	<b>4.1</b>	<b>1.8</b>	<b>266</b>	<b>2.4</b>	<b>1.0</b>
	Centre	105	4.7	2.1	229	4.1	2.0	280	4.4	1.9	107	2.3	0.7
	Periphery	24	3.6	2.4	173	4.4	2.5	232	3.7	1.5	159	2.4	1.2
Most common types of building and street integration for vacant shops	<b>City</b>	<b>Next to other stores in the ground floor of a residential building (60%)</b>			<b>Next to other stores in the gf of a residential building (41%) or a building with residences and services (25%)</b>			<b>Next to other stores in the gf of a residential building (48%) or a building with residences and services (27%)</b>			<b>Next to other stores in the gf of a residential building (43%)</b>		
	City Centre	Next to other stores in the gf of a residential building (63%)			Next to other stores in the gf of a residential building (55%) or a building with residences and services (20%)			Next to other stores in the gf of a residential building (43%) or a building with residences and services (32%)			Next to other stores (52%) or not (20%) in the gf of a residential building		
	Periphery	In a purposely built structure (25%), or in the gf of a residential building without adjacent stores (21%)			Next to other stores in the gf of a residential building (41%) or a building with residences and services (35%)			Next to other stores in the gf of a residential building (55%) or a building with residences and services (21%)			Next to other stores in the gf of a residential building (37%) or a building with residences and services (20%)		

Through the plotting of vacant shop patterns (Figure 2), It can be seen that vacant shops have clearly a statistically significant clustered pattern, both at small and larger distances, something that was further confirmed by plotting Ripley’s K-function (Dixon, 2014) (not reproduced here as results were always above the random distribution; i.e. clustered). Figure 2 also displays, as an example, the integration value for  $r = n$  for each city. Comparing directly the location of vacant shops to the classification of the segments that serve them, the common assumption of Space Syntax literature that shops require movement, and thus will underperform in segregated segments, can again be challenged as previous authors did (e.g. Teklenburg *et al.*, 1994; Saraiva, 2013). With the exception of the local scale (very small radii), less than 40% of vacant shops are actually located in segregated segments (the last three quantiles of integration or choice) (Figure 3). This number is lowest in Leiria and Vila Real for integration, and in Évora for choice.

This may be caused by the structure of the grids. Vila Real and Leiria present a centre surrounded by various localities/boroughs, once satellite villages. Here, there are small-scale centrality structures, where most stores are usually located. Évora, on the other hand, is structured as a series of radial travel-through thoroughfares connecting peripheral neighbourhoods (which developed around these edge-roads) to the city centre. Here most available shop spaces are located in streets that are well connected (hence higher choice), even if they may be segregated in terms of integration. Although Aveiro has an overall similar structure, there are actually few travel-through axes with shops, and in the periphery many traditional commercial spaces are inside a segregated, semi-rural, confuse network. Lastly, with the single exception of Vila Real for ‘integration’ (the city with less new peripheral construction), over 60% of vacant shops in both integration and choice segregated segments for all radii are in post 1975 buildings.

To further confirm these assessments, correlations between spatial densities were performed. Table 3 displays the Pearson correlation coefficient between the density of vacant shops with the 18 variables previously selected. Overall, vacant shops are of course highly correlated with the presence of open shops (retail spaces tend to cluster) ( $R \sim 0.8$ ), but they also correlate well with height density ( $R \sim 0.8$ ) and the density of post-1975 buildings ( $R \sim 0.7$ ), except in Évora ( $R \sim 0.3$ ), a city that practically does not have new construction in the centre. These values reaffirm the issues of the overt real estate expansion these cities have been subject to, and the greater vulnerability of most

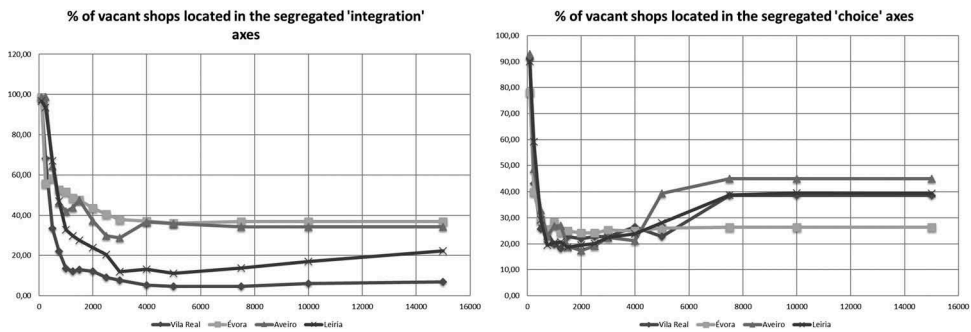


Figure 3. Percentage of vacant shops located in segregated axes, both for ‘choice’ and ‘integration’.

**Table 3.** Density correlations (using Pearson correlation coefficient) with vacant shop density.

Variables	Cities			City centres			Peripheries					
	V. Real	Aveiro	Leiria	Évora	V. Real	Aveiro	Leiria	Évora	V. Real	Aveiro	Leiria	Évora
Population density	0.489	0.453	0.467	0.316	0.464	0.399	0.382	0.363	0.306	0.412	0.509	0.356
Shop space density	0.786	0.898	0.838	0.821	0.740	0.867	0.812	0.882	0.510	0.856	0.829	0.632
Open shop density	0.741	0.849	0.759	0.761	0.689	0.810	0.735	0.848	0.425	0.760	0.682	0.4
Block area density	-0.122	-0.358	-0.271	-0.267	-0.300	-0.332	-0.370	-0.475	-0.097	-0.301	-0.206	-0.249
Building density	0.575	0.514	0.427	0.569	0.580	0.682	0.585	0.810	0.354	0.190	0.393	0.306
Height density (retail buildings)	0.827	0.840	0.810	0.793	0.813	0.77	0.779	0.837	0.408	0.818	0.802	0.618
Post 1975 retail building density	0.710	0.688	0.776	0.330	0.665	0.490	0.658	0.070	0.385	0.871	0.825	0.635
Integration density (r = 500)	0.701	0.524	0.639	0.707	0.726	0.615	0.612	0.777	0.309	0.222	0.529	0.348
Integration density (r = 1250)	0.696	0.684	0.684	0.605	0.700	0.587	0.641	0.653	0.323	0.413	0.537	0.279
Integration density (r = 3000)	0.572	0.570	0.636	0.535	0.600	0.513	0.623	0.656	0.292	0.409	0.492	0.253
Integration density (r = 5000)	0.536	0.515	0.639	0.511	0.575	0.502	0.612	0.655	0.271	0.371	0.529	0.285
Integration density (r = n)	0.504	0.497	0.528	0.507	0.576	0.488	0.600	0.657	0.267	0.348	0.409	0.285
Choice density (r = 500)	0.597	0.666	0.632	0.657	0.700	0.639	0.650	0.820	0.276	0.440	0.531	0.390
Choice density (r = 1250)	0.577	0.634	0.622	0.619	0.693	0.607	0.661	0.806	0.287	0.425	0.505	0.371
Choice density (r = 3000)	0.544	0.603	0.605	0.594	0.664	0.594	0.668	0.808	0.278	0.422	0.485	0.360
Choice density (r = 5000)	0.534	0.597	0.587	0.584	0.654	0.593	0.666	0.806	0.270	0.416	0.466	0.357
Choice density (r = n)	0.522	0.594	0.567	0.584	0.652	0.588	0.661	0.806	0.265	0.415	0.446	0.355

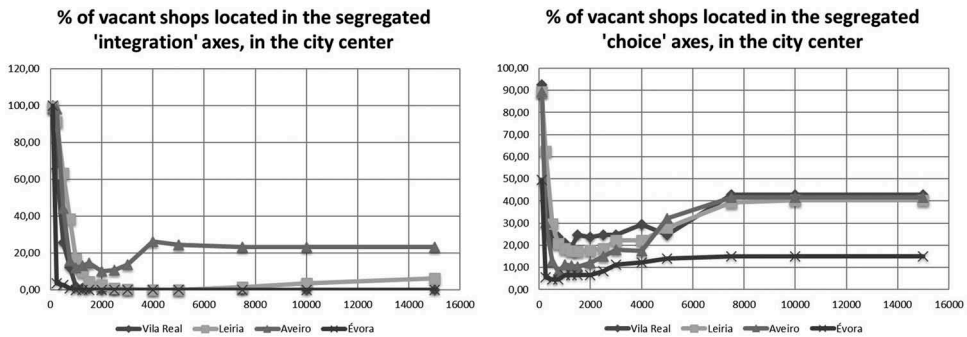
recent retail establishments, even if in higher, multifunctional buildings. In fact, vacant shops correlate less well with population density ( $R \sim 0.4$ ); that is with closeness to market, and are inversely poorly correlated with block area ( $R \sim -0.3$ ). Furthermore, it is emphasized that vacant shops may exist in areas with good local integration ( $R \sim 0.7$ ) and choice ( $\sim 0.6$ ), although the affinity decreases as the radii increases. It is also confirmed that Évora presents the lowest correlation for integration, except at local radii in which it is Aveiro. Vila Real has the lowest correlations for choice.

## 5.2. The City Centres

City centres present two distinct hotspots of vacant shops (Figure 2), which prove to have similar morphological characteristics in the four case studies. The first location is within the traditional downtown areas, where the street network is narrower and building heights are lower. The city centres thus present the highest inverse correlations of vacant shops to block area ( $R \sim 0.4$ ), and the lowest correlations to post-1975 buildings (with the comprehensible exception of Évora), and to building heights in the cases of Aveiro and Leiria (the two largest cities with the more developed peripheries). In this location more ‘closed’ shops were identified which can both signify the downturn historical city centres have experienced in later years (particularly during the crisis) but also the lack of dynamics to regenerate these area’s commercial fabric. However, it should be noted that vacant shops are not in the centuries-old high streets and squares of the traditional centres, which have been maintained or regenerated due to their popularity, pedestrian flow, and the processes of corporatization and touristification. Vacant shops are rather in smaller, second-level commercial streets, often perpendicular or parallel to the traditional high-street, that have now lost their commercial importance as the city centre, and the city itself, grew. The once aptly named Merchants Street in Évora, just off the main central square, is one of such cases, with 8 vacant shop spaces in a total of 18 at the time of data collection.

The second hotspot location is the distinct new development areas, characterized by larger street axes composed of multi-functional buildings of recent construction. These areas present greater number of floors, and generally combine office, service and commercial spaces on the ground floors with homes on the upper floors. Thus, vacant shops present in the centres an expected higher correlation to building and open shop density ( $R \sim 0.6-0.8$ ). Here most vacant shops were found ‘empty’, being that in some extreme cases, they have never been occupied at all since construction. But again, many of these spaces are in by-streets to the main thoroughfares. For example, D. Glória Barata Rodrigues Street in Leiria (the vacant shop hotspot at the North edge of Leiria’s city centre) had 25 vacant shops in 47 available. However, it is just one street to the North from one of the most bustling, relatively new commercial and service arteries in the city, Avenue Dr Adelino Amaro da Costa. Considering this scenario, it is perhaps unsurprising that Évora’s city centre, which does not possess these rows of multifunctional neighbourhoods of recent construction (the correlation to post 1975 building density is just  $R \sim 0.1$ ), has the smallest percentage of vacant shops in relation to the city’s total (40%).

The centre analysis further confirms that vacant shops do not have a strong association to segregated segments (Figure 4, Table 3). In fact, for integration, and for radii over 1 km through the network, there are no vacant shops in segregated segments in Vila Real and



**Figure 4.** Percentage of vacant shops located in segregated axes in the city centres, both for 'choice' and 'integration'.

Évora's centres, and only around 6% in Leiria's. Only in Aveiro, a city with a dominating large and central avenue, there are 20% of vacant shops in segregated axes. The coefficient of correlation between density patterns of segments and vacant stores also stays generally above 0,6. These city centres assume the role of destinations for their larger urban areas, hence shop spaces are generally located in centrality axes. Locally (i.e. at smaller radii), most vacant shops in segregated segments are in post-1975 buildings, something which may attest to the durability of traditional commercial streets. For higher radii, 90% of Leiria's centre vacant shops in segregated integration segments are in post-1975 buildings and the correlation of these to vacant shops is the highest in the four cities ( $R \sim 0.7$ ).

The number of vacant shops in segregated segments, as well as the overall correlations, increase when looking at choice, something which seems to indicate that centre shops prefer (or need) to be in destinations rather than in distributors. The patterns of all cities are strikingly similar, except in Évora. Locally, 10–20% of vacant shops are in segregated choice segments, with this number increasing to around 40% at a global scale. Correlations are between 0.6 and 0.7. Again, these numbers are caused by younger neighbourhoods at the edges of the city centre boundaries. Despite their multifunctionality and number of inhabitants (the coefficient of correlation of vacant shops with population density is around 0.4), they are located in places of the network that become more segregated as the radii increases and the centrality of the traditional city centre and the travel-through potential of the major streets leading to the suburbs are exacerbated. The percentages of vacant shops in segregated segments and post-1975 buildings is higher (70–80%) precisely in the two city centres in which the amount of available shops spaces in these developments is higher: Vila Real and Leiria. In Évora, the number of vacant shops in segregated segments is lower (around 15%) as there is a very good correlation with choice ( $R \sim 0.7$ ). This world heritage site contains a very clear retail structure centred around specific main axes, that connect to the suburbs.

### 5.3. The Peripheries

All the case-study peripheries contain little less than half of the respective cities' vacant shops, with the exception of Vila Real's, whose amount is just 19% (Table 2). This is the result of an unbalanced urban perimeter (Vila Real's periphery comprises 90% of the

city's total area but only contains 30% of the city's shops) encompassing semi-rural and green areas, where little residential and commercial construction has occurred in the past decades. This explains the comparatively low values, in relation to the other cities, of the correlation between vacant shops and block area ( $R \sim -0.1$ ), building height and building age (both  $R \sim 0.4$ ). The opposite happens in the remaining cities, whose peripheral construction was larger. The number of vacant shops in post 1975 buildings is somewhat similar: 77% (in Aveiro), 79% (in Leiria) and 85% (in Évora); and building height and building age correlate highly in Évora ( $R \sim 0.6$ ) and very high in Aveiro and Leiria (both  $R \sim 0.8$ ).

As [Figure 2](#) illustrates, the geographical pattern of vacant shops in the peripheries is much more sporadic. However, most vacant shops can be found in the same type of location, which the research team termed as 'commercial island'. This is a concentration of stores on the ground floor of a recently constructed multi-family building within an otherwise residential, often single-family, neighbourhood. This explains low correlations with building density ( $R < 0.4$ ) but higher correlation with open stores ( $R \sim 0.7$ ), building heights and post-1975 buildings (both  $R \sim 0.8$ ), particularly in the more developed suburbs of Leiria and Aveiro. It is true that these 'islands' have been instrumental in introducing proximity retail in peripheral residential neighbourhoods that previously had no shops, or just a few traditional small-scale establishments (such as a greengrocer). But there hardly is a case documented in this research that has full store occupancy, even in those 'islands' located near large residential concentrations. In fact, some display indisputable signs of dereliction. For example, in the Marinheiros' district of Leiria, namely in Cónego José Pereira Lacerda Street ([Figure 5](#)), 9 of the 15 available shop spaces are vacant, despite the fact that this is a densely populated residential neighbourhood just North of the city centre (noteworthy that Leiria's periphery presents the highest correlation of vacant shops with population density,  $R \sim 0.5$ ). In Évora, where the periphery has evolved as a series of such pockets of residence and commerce along expansion axes, the comparative amount of vacant shops is the highest.

Again, the planning and regeneration of such commercial locations needs to received added scrutiny. Despite being close-to-market, residents of these peripheral residential neighbourhoods have their daily shopping routines elsewhere (in big box



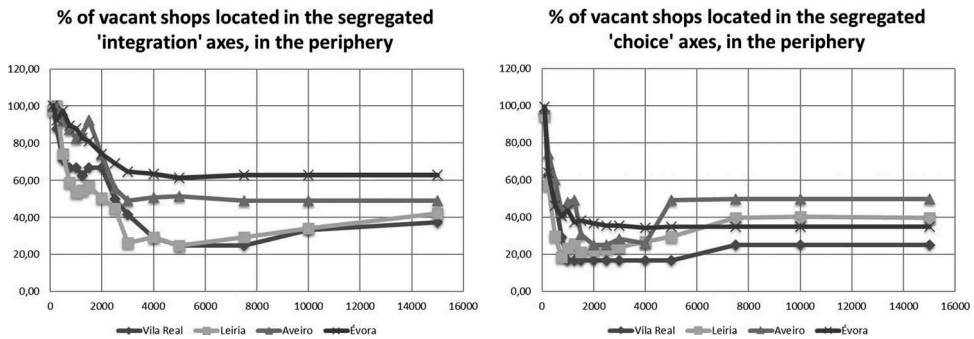
**Figure 5.** Model and aerial photograph of the commercial island in Cónego José Pereira Lacerda Street in Marinheiros, Leiria; showing vacant shops (aerial photograph taken from [www.bing.com](http://www.bing.com)).

developments or at the city centre close to work) and only require a few first necessity stores near home. Indeed, open shops in these 'islands' belong inevitably to the same types (a news-stand, a coffee shop, a hairdresser). Hence these once usable spaces remain derelict, affecting surrounding urban areas, particularly as commercial hierarchies evolved, modern commercial formats proliferated, and phenomena such as the economic crisis decreased the surviving rate of commercial establishments. Another example, the once award-winning mix-use social housing neighbourhood of Malagueira (built between the late 1970s and 1990s), located West of Évora's city centre, has 36 shop spaces to serve its 1200 dwellings. At the time of data collection, 17 of these were vacant.

Outside the main residential areas of the suburbs, vacant shops are harder to find. In isolated, often rural residential areas, farthest from the city centre and at the edges of the city's urban perimeter, there is a scarce offer of shop spaces. Even so, these are mostly open, as they comprise well defined, even if small and traditional, commercial hubs composed mostly of first necessity stores (at an important street crossing for example). Actually, the commercial concentrations of the 'islands' appear to serve mainly their own tenants, and not the pre-existing dwellers of older neighbourhoods which still rely on the small and traditional network of first necessity traditional shops. Only when the new multifunctional developments or 'islands' are built in close proximity to the traditional suburban retail hub, does it appear to affect the vacancy rate found. In the suburb of Sismarias, Northwest of Leiria's city centre, 7 of the 12 shop spaces in a one block radius around the train station (a supposedly natural hub for retail), are vacant. But Sismarias has had a large amount of urban development in the past two decades, including various residential buildings with store spaces on the ground floor, and competing hypermarkets in close-by streets.

Lastly, the syntax analysis (Table 3) shows that, at various radii, the correlation between the integration segments and vacant shops is generally low, with  $R \sim 0.5$  in Leiria and  $R \sim 0.3$  in the remaining cities. On the other hand the direct association of stores to segments (Figure 6) shows that at radii under  $r = 2000$  m, more than three quarters of vacant shops in Évora's and Aveiro's peripheries, and over half in Leiria's and Vila Real's, are in segregated segments. Corroborating previous research, this may mean that local centrality is essential to guarantee the success of shops in peripheral locations. Furthermore, with the obvious exception of the outlier Vila Real, over 80% of vacant shops are in buildings constructed after 1975. Peripheral traditional commercial clusters seem to be surviving, even with just a small amount of shop spaces, whereas new developments have not been able to maintain their occupancy. The fact that big box developments in these cities are primarily in the suburbs, relatively close-by, may also contribute to this lack of success of 'commercial islands'. Globally, between 40 and 60% of vacant shops are in segregated integration segments. The value is greater in Évora, where most 'commercial islands' are inside the peripheral residential neighbourhoods, hence farther from to-movement axes. A drop between  $r = 3000$  and  $r = 5000$  m is perceptible in Vila Real and Leiria, as between these radii a greater portion of the city becomes accessible. In that period, all of Vila Real's periphery vacant shops are in pre-1975 buildings, attesting to the lack of recent construction the farthest areas of this city have witnessed.





**Figure 6.** Percentage of vacant shops located in segregated axes in the peripheries, both for 'choice' and 'integration'.

The correlation is slightly higher for choice and a lower affinity is found in the association of stores to segments. There are only around 20–30% vacant shops in segregated segments at a local scale and between 30 and 50% at a global scale. This may be explained by the fact that the main commercial locations in the suburbs, even those associated to residential buildings, are generally located facing or near through-movement thoroughfares leading to the city centre. Aveiro, where this relationship, globally, is higher (50%), is precisely the city where there are fewer of these axes connecting the periphery to the centre, as the centre is not central within the urban perimeter. There is also an overwhelming amount of vacant shops in segregated segments located within post-1975 buildings. With the exception of Vila Real for lower radii (75%), this number is, for all radii and all peripheries, superior to 85%. Again, these seem to relate to 'commercial islands' and other commercial developments close to residential areas yet farther from the high choice axes.

## 6. Debate and Conclusions

Urban dereliction is still one of the major problems urban areas face today. Despite downtown regeneration processes, the strong presence of multinational brands and the increase of tourism and tourism-related development, urban dereliction, as urban shrinkage, is a reality in many European cities of various sizes – a reality that has definitely aggravated with the economic crisis of the late 2000s and early 2010s. The retail sector was one of the most affected during the economic crisis and the dereliction of store spaces is one of the most visible signs of the downturn witnessed in urban spaces, and a catalyst for a negative domino effect that aggravates socio and economic conditions.

However, almost paradoxically, there is a notoriously lack of statistical information regarding the location and characterization of vacant commercial sites. Available studies giving centre-stage to vacant sites are scarce. Scarcer still are those that look beyond the major cities to address medium-sized or smaller cities, the backbone of the inland urban systems and which are gaining more prominence in cohesion and polycentric debates, despite having also been strongly affected by the economic crisis. Furthermore, vacancy has been studied from a socio-economic perspective, but not actually from an urbanistic or

morphological perspective, even if previous research has already established strong correlations between some morphological elements (such as the nature of the grid) with store densities. This paper addresses these triple shortcomings by opening the debate on the relationships between commercial vacancy and morphological patterns in urban areas, particularly in a crisis context. Economic factors play a decisive role, but they cannot be considered as the only relevant factor. Indeed, the research hypothesis is confirmed. The patterns in the four cities do converge (often with striking similarities), and invariably point to a lesser importance, for example, of population density in explaining vacant shops, and more of building age and height, or location in the grid. Furthermore, contradicting the common assumption of Space Syntax literature, a less than expected association of vacant shops to segregated segments was found. Shops do not necessarily underperform in segregated segments, at least in suburban or smaller-sized areas. Being in places of local centrality is important, something that seems to highlight the durability of traditional commercial areas, whereas the closeness to distribution and travel-through axes seems to be an important factor for stores farther from the city centre.

These findings help to better understand the urban organics of vacant shops, not only in terms of locational behaviour but how they relate to movement, the grid, the building fabric, and the land-use mix. This is important because these characteristics are not entirely shaped by market factors; hence, they should be addressed by urban planners in the design and allocation of future commercial land use, but particularly in the managing of post-crisis existing derelict spaces within regeneration strategies. According to O'Mahony and Rigney (2016) the persistence of vacancy and dereliction challenges the effectiveness of planning practices, and that may be the reason why planning discourses touch this issue in a very narrow way. The authors go as far as to propose that dereliction may well arise from the functioning of the planning system itself. In the case of Portugal, the permissive planning legislation allowed for an excess of offer and a profuse dispersion of store patterns, which have proven vulnerable to severe economic conditions. The fact that vacancy displays a clear-clustered pattern in the four case studies, further emphasizes the need to act on specific areas, given its more detrimental effect than distributed vacancy. Notably, these areas are not solely within traditional historical centres, usually the main object of retail regeneration policies and incentives. Multi-functional clusters of shops, homes and services in peripheral locations, for example, have become highly exposed to the economic downturn, regardless of being close to market.

As Myers and Wyatt (2004) note, without proper data, it is difficult to make efficient development or planning decisions surrounding regeneration of vacant retail sites, both for planners and developers. Initiatives such as the Empty Stores Network<sup>3</sup> in the United Kingdom, starting in 2008, are dedicated to help people re-use and recycle vacant shops and stimulate the appearance of pop-up shops. Even more recently, in 2016, the city of Amsterdam has developed an online platform signalling vacant, non-residential buildings,<sup>4</sup> in order to hotspot parcels of potential development and boost sustainable re-use. Our research has moved beyond location and centrality assessments of previous studies, contributing with detailed knowledge on the morphological characteristics of vacant sites. By showing that these characteristics are common to various case studies and follow certain rules, we can anticipate future problematic areas in recession or shrinkage downturn periods, thus influencing the planning decision-making process and the overall selection of retail sites by promoters.

For Katyoka and Wyatt (2008) vacancy is a deep, complex issue that needs to be unravelled before drafting and implementing national and local policies and development strategies. Public officials and decision makers are concerned with the undesired spatial and socio-economic consequences of the various restructuring processes and enduring commercial transitions associated to various stages of development and regeneration (Kompil & Celik, 2006). But as Teller (2008) points out, it is much easier to control commercial mix within a private space (a shopping centre) than in the street. The general principles of free enterprise regarding the creation, operation and access to economic activities should not be put into question. But this does not mean that equitable economic development is separated from the questions of land ownership, access and management (Dobson, 2016), nor that urban policies cannot exert a larger control on the suitable limits for the amount and type of commercial offer in given areas, as well as promoting land-use change, the design of transport networks and finding short-term solutions for the vacancy problem. These have included, for example, the promotion of marketing events to potentiate creative business opportunities (Balsas, 2014) or the creative use of spaces by local artists (Booth, 2009), such as art projects in vacant storefronts (Rosenberg, 2011) or several other low-budget initiatives (Ferreri, 2015; Ziehl & Oßwald, 2015).

The shortcomings of this research are however recognized. In future works, further sensitivity analyses have to be performed on the data, experimenting different cell sizes, other forms of spatial correlation, and different spatial, socio-economic and accessibility variables, to confirm the results here demonstrated. It should also be important in the near future to update the commercial database, in order to understand if moving from the crisis period, the morphological characteristics of vacant sites have been maintained.

## Notes

1. Space Syntax was pioneered in the 1970s by Prof. Bill Hillier, Prof. Julienne Hanson and colleagues at The Bartlett, University College London. Hillier's collective works are suggested for further insights on the theories and techniques of Space Syntax.
2.  $r = 100, 250, 500, 750, 1000, 1250, 1500, 2000, 2500, 3000, 4000, 5000, 7500, 10000, 15000$  and  $n$ .
3. <https://emptyshops.wordpress.com/>.
4. <http://maps.amsterdam.nl/leegstandsk kaart/>.

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