

EXPLORING THE SPATIALITY OF SHOPPING PATTERNS IN BELGRADE, SERBIA

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Summary

Retail, shopping and consumption are important determinants of the modern city, its society, way of life, spatial structure, and its economy. Over the past 20 years, Belgrade, the capital of Serbia, has been marked by changes in the retail sector in terms of the structure of retail facilities, shopping space, consumer behaviour and mobility. This research focuses on the shopping movements within the two distinctive consumer populations: the employed and the non-employed (unemployed, retirees, housewives), addressing the similarities and differences between them. It relies on the data from a survey on the daily mobility of residents in the territory covered by the Belgrade Master Plan, which included 15,006 respondents. The main research method is a spatial analysis that has allowed the identification of the spatial patterns of shopping mobility and the underlying rules. Our

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results have shown that the dispersion of shopping, attraction zones and loyalty to the neighbourhood influence and shape the patterns of shopping mobility in Belgrade.

Keywords: Shopping, spatial patterns, attraction zones, dispersion, central places, Belgrade, Serbia.

Zusammenfassung

ANALYSE RÄUMLICHER MUSTER DES EINKAUFsverHALTENS IN BELGRAD, SERBIEN

Einzelhandel, Einkauf und Konsum im Allgemeinen sind wichtige Erscheinungsformen der modernen Stadt, ihrer Gesellschaft, Lebensweise, räumlichen Differenzierung und wirtschaftlichen Aktivitäten. Belgrad, die Hauptstadt Serbiens, ist in den letzten zwanzig Jahren von zahlreichen Veränderungen im Einzelhandel geprägt – in der Struktur der Einzelhandelsobjekte, in den Verkaufsflächen, im Einkaufsverhalten und in der Mobilität der Kundinnen und Kunden. Die vorliegende Studie konzentriert sich auf Einkaufsmobilität, und zwar auf Gemeinsamkeiten und Unterschiede im Einkaufsverhalten der beiden Hauptbevölkerungsgruppen – Erwerbstätige und Nicht-Erwerbstätige (Arbeitslose, Rentner, Hausfrauen). Sie fußt auf Daten einer Umfrage über das tägliche Einkaufsverhalten der Bewohner im Gebiet des „Belgrade Master Plan“, an der 15.006 Befragte teilnahmen. Im Zentrum der Untersuchung steht eine räumliche Analyse, mit deren Hilfe die räumlichen Muster des Einkaufsverhaltens untersucht und die Gesetzmäßigkeiten, die sie bestimmen, identifiziert werden sollen. Unsere Ergebnisse haben gezeigt, dass die Standortdifferenzierung der Einkaufsmöglichkeiten, die Attraktivität der Standorte und die Loyalität gegenüber der Nachbarschaft die räumlichen Muster der Einkaufsmobilität in Belgrad beeinflussen und prägen.

Schlagwörter: Einkaufsverhalten, räumliche Muster, Standortqualität, Einkaufsmobilität, Standortdifferenzierung, Belgrad, Serbien.

1 Introduction

Consumer activities are implicit to the society of modern cities, and retail is one of the most dynamic sectors of urban economy (JACKSON and THRIFT 1995; CLARKE 2003; JAYNE 2006; MILES 2010). The consumer spatial behaviour is probably the broadest and the most complex issue in the geography of retail and consumption. Scholars argue that people make decisions about where to buy based on their needs for specific goods and the resources they have or constraints they face (material, spatial and temporal) (HÄGERSTRAND 1970; EYMANN 1995). Related is the well-known principle of the nearest shop that people tend to purchase the necessary products from the closest store available (BROMLEY and THOMAS 1993; WESTLAKE 1993; WILLIAMS and HUBBARD 2001). Studies on shopping mobility show that the local attachment to the neighbourhood is particularly pronounced among older adults, mothers with young children, housewives and less mobile residents

(NAGY 2001; NOVÁK and SÝKORA 2007; CACHINHO 2014). Certainly, different consumer needs, motives and capabilities can significantly modify this general regularity (VAN LEEUWEN and RIETVELD 2011).

In post-socialist cities, the trend of an intensive retail development and the expansion of a consumer lifestyle have taken root since the early 1990s (KREJA 2006; STANILOV 2007). Major changes in the spatial structure of these cities include the commercialisation and expansion of urban cores, the differentiation of retail facilities in the city centre, the emergence of new retail and entertainment hotspots (SÝKORA et al. 2000; PARYSEK and MIERZEJEWSKA 2006; SIĆ 2007).

Post-industrial changes and commercialisation also affected Belgrade, the capital of Serbia. Major changes in Belgrade happened after 2000, involving a shift of the main retail actors (big international companies instead of numerous private retailers) accompanied with the transformation of retail spaces. The number of small local shops has noticeably decreased, while new modern retail formats (hypermarkets, shopping centres) emerged and gained attractiveness (HIRT 2008; LOVRETA 2008). Changes in the retail space have affected consumers, who were forced to adapt to new retail facilities, their changed spatial organisation, and new centres of gravitational attraction. The routes to shopping venues, the frequency and length of shopping movements have also changed (NAGY 2001; NOVÁK and SÝKORA 2007; LOVRETA 2008; AKSENOV 2016).

Shopping mobility and habits also depend on one's employment status, income, lifestyle, life phase, needs, duties, etc. Studies (e.g., SMITH 1992; NAGY 2001) show that older adults (retirees) have adapted the least to the spatial changes in retail. For them, the proximity of the shop and the connection to the public transport is crucial, perceiving new hypermarkets and shopping malls as distant, both physically and psychologically. More mobile residents belonging to the middle and upper classes have perceived shopping malls as attractive and have started visiting them.

According to some studies, consumers are more likely to choose the closest venue (shop) that meets their needs for a particular good or service (GORTER et al. 2003; EVERS et al. 2005; HENSHER et al. 2005; VAN LEEUWEN and RIETVELD 2011). In addition, there are targeted movements towards specific desirable consumer venues (e.g., shopping malls, hypermarkets, specialty stores) (GORTER et al. 2003; KUNC et al. 2012; DOLEGA et al. 2016). These are the zones of shopping attractions, hot spots, which are especially attractive for shopping. The literature also suggests that consumer activities follow primary functions – housing and work, as well as the spatial patterns of labour (primary) mobility and occur close to the destinations of labour movements (MARJANEN 1997; NOVÁK and SÝKORA 2007).

While the study on shopping behaviour in the urban setting of post-socialist Prague (NOVÁK and SÝKORA 2007) analyses the specific spatial factors of the changing shopping mobility, a detailed spatial analysis of the residents' movements is missing in the greatest part of the cited literature. This paper aims to fill that gap by focusing specifically on the spatial dimension of mobility. The main research questions are: How does the socioeconomic status of residents influence the spatial aspects of shopping movements? Are the spatial patterns of shopping mobility in Belgrade in accordance with the general spatial patterns of shopping in the city?

The paper examines the two most numerous and most influential groups in the context of shopping – the employed and the non-employed residents. The employed are the group with the higher income and they get involved in the regular labour (primary) mobility. Unlike them, the non-employed include retirees, unemployed and housewives, who are not involved in the compulsory primary movements. The study relies on the data from a survey on the daily local mobility of Belgrade's residents. The analysis was done on a sample of 15,006 respondents living in the territory covered by the Belgrade Master Plan (BMP).

By analysing and comparing the shopping movements of two different socio-economic groups, we recognise the spatial pattern and dominant rules of shopping mobility in Belgrade. Special attention is paid to the relationship between labour (primary) and shopping (consumer) movements, the share and significance of local (neighbourhood) shopping movements and the importance of attractive shopping venues.

2 Retail Structure in the Post-Socialist City

The spatial shopping patterns of the population are shaped mainly by the development and distribution of retail in the city. In post-socialist cities, changes in the retail sphere and changes in consumers' purchase habits have come to the fore. Due to the crisis of the 1990s, Serbia and Belgrade went through a slow process of post-industrial transformation and commercialisation. The retail network in Belgrade has certainly changed significantly since that time. The oldest elements of the retail network in Belgrade took shape as early as the late 19th century and between the two world wars (MACURA 1984). These are the most important shopping streets in the historical core of Belgrade and Zemun with numerous individual shops and the oldest department stores (Fig. 1) (BOŽIĆ 1991). In decades after the late 1940s, significant changes took place: the city's growth in terms of population size and spatial extent (especially the construction of New Belgrade), the expansion and modernisation of the retail network (new local shopping centres, new retail formats) as well as changes in consumer habits and preferences in line with Western European shopping standards (BOŽIĆ 1991). However, in the 1970s and 1980s, retail development, with insufficient shops and fragmented retail facilities, could not keep up with the rapid population growth in the city (LOVRETA 1986). The decision-making factors that hindered retail development were associated with the general non-market economy and the retail supply concept. Planning and practice were not harmonised, whereas the political sphere dominated the economic domain (BOŽIĆ 1991; LOVRETA 2008).

The early transition period of the 1990s was marked by the emergence of highly fragmented and randomly scattered small informal shops that sold fast-moving consumer goods and had a significant share in sales. These mainly were improvised shops with minimal area and street kiosks (LOVRETA 2008) or apartments, garages and other informal spaces used as retail outlets in all parts of the city in response to the economic crisis. Between 1990 and 2000, almost 20,000 new retail establishments were set up in the city, most of which falling into the category of informal shops (Office for Informatics and Statistics 2005).

The period after 2000 has been marked by intensive changes in the economic and spatial structure of retail. The grey market was diminishing, while the share of modern retail formats was increasing along with the improvement of economic indicators (LOVRETA 2008). Small local shops were suppressed by the aggressive emergence of large international companies (HIRT 2008). Between 2001 and 2020, the total number of shops in Belgrade decreased by more than 6,000, thus increasing the number of inhabitants per shop from 63 to 84 (Office for Informatics and Statistics 2021). Already in 2008, the main actors in the Belgrade retail market of food and fast-moving consumer goods were large retail chains which predominantly relied on supermarkets, superettes and hypermarkets. During this time, there was a notable increase in the number of shopping centres as 29 new facilities established (Office for Informatics and Statistics 2021) in both densely populated neighbourhoods and peripheral areas along major roads. The supremacy of new formats illustrates that the large shopping mall “Delta City” opened in 2007 was a more popular choice (29.8 % of consumers) than all local shopping centres (22.6 % of consumers) (LOVRETA 2008). Open markets, as a traditionally important retail format, retained their sites and about 20 new ones were established (LOVRETA 2008).

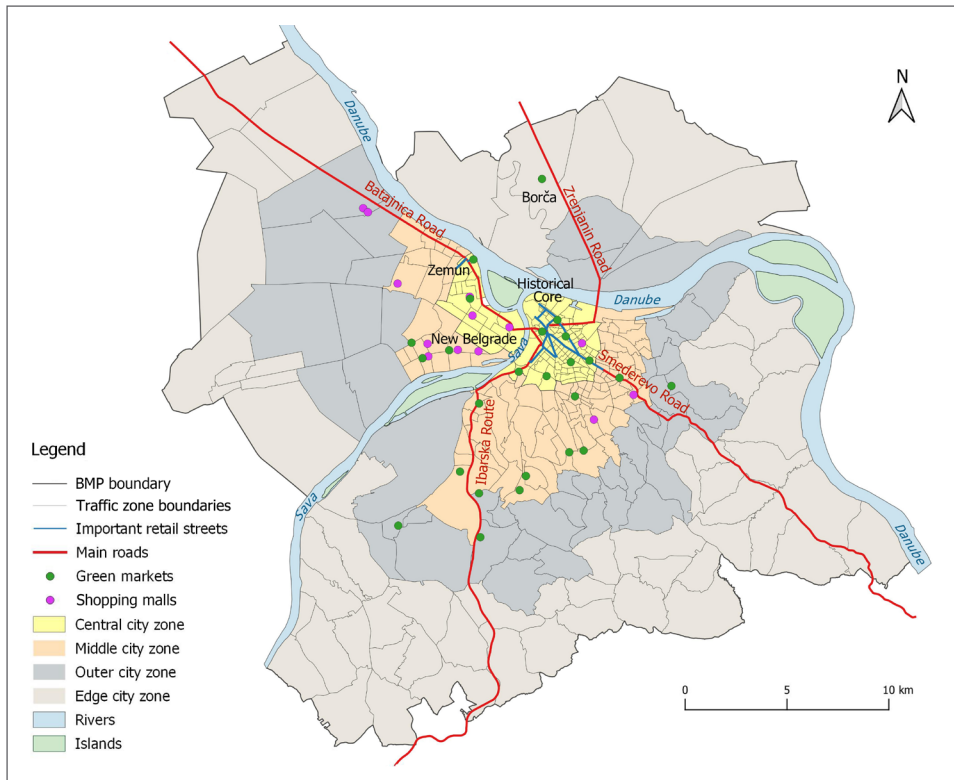
The first decade of the 21st century was also marked by uneven spatial development of commerce in Belgrade’s municipalities. Significant greenfield investments by prominent local and international companies were observed in the municipalities with sufficient space to construct new facilities (e.g., New Belgrade and Palilula). The retail network in New Belgrade became comparable to those of the most developed capitals of countries in transition. In the central city municipalities (Vračar, Savski Venac and Stari Grad), with traditionally developed commerce, the room for establishing new large retail formats was limited. In other municipalities, which also included peripheral and rural areas, retail was poorly developed because even classic shopping facilities were lacking (LOVRETA 2008).

In the current spatial structure of retail outlets in Belgrade, the central city zone stands out (Figure 1). This zone includes three nuclei: the historical cores of Belgrade and Zemun and the centre of New Belgrade. This is the city zone with the highest rents (CBD). It is occupied by offices, shops, and housing facilities, while retail outlets are distributed in concentric circles, strips and separate units. The historical core of Belgrade contains leading commercial and business streets: Kneza Mihaila, Kralja Milana and Bulevar Kralja Aleksandra; Glavna and Bežanijska streets are located in the centre of Zemun.

As the distance from the central city zone increases, some activities disappear, but commerce persists along the exit routes (communication lines). However, distinct commercial complexes (integrated shopping centres, retail parks, hypermarkets) can be found. In addition, dispersedly distributed retail outlets in all city zones contain many traditional retail outlets serving the local population (LOVRETA 2008). The centralisation and decentralisation of retail in Belgrade are currently unified processes involving the reconstruction of the historic city centre (a pedestrian shopping area and closed retail complexes) and the building of shopping centres in the city’s access areas (Master Plan 2003; LOVRETA 2008).

The distinct and typical formats in Belgrade’s diversified retail system include: small shops in the neighbourhood, open markets and shopping centres. The network of small

shops, which can be found in every neighbourhood, persists due to the residents' need to have supplies available in the nearest (small) store, despite frequent changes and the fact that shops get established and disappear in the same easy way.



Source: Authors 2023 (own design)

Figure 1: City zones and main retail structures in the Belgrade Masterplan Area

In Belgrade, open markets are old institutions of trade. Their main offer includes fresh agricultural and food products, primarily fruits and vegetables. Various manufactured, industrial alimentary and non-alimentary, new and/or used products are sold at open markets. In addition to stalls as a traditional market structure open markets also house various retail facilities complementing the offer (bakery, dairy and industrial products stores, etc.), i.e., they rely on the cumulative attractiveness of the market location. The network of markets in the territory covered by the Belgrade Master Plan is well developed and it includes a total of 44 open markets, of different sizes, from those with 10 stalls (Žarkovo) to those with 1,000 stalls and 100 stores (Kalenić). Despite the increasing competition from more modern retail forms, open markets retain attractiveness in the supply chain (LOVRETA 2008).

Shopping malls are a paradigmatic retail format in post-socialist cities, a hallmark of changed economies, spaces and lifestyles. There are two key phases in their development in Belgrade. Individual tenants spontaneously formed the offer of the shopping malls of the first phase without a common business strategy. Retail outlets were combined with some services, lacking entertainment and catering components. Their appeal was mostly local, and consumers perceived them as a concentrated retail offer. They were more similar in character to the department stores of the 19th century (VUKSANOVIĆ-MACURA and TODORIĆ 2019) than to global shopping malls.

The second phase began after the 2000s, with the establishment of regional shopping malls, where the offer included entertainment components (fast food restaurants, cinemas, bowling alleys, casinos, children's playrooms) along with retail outlets and the offer dominated by chains of licensed global brands (LOVRETA 2008). In 2015, all new shopping malls were located in New Belgrade, except for one (Zira, opened in 2007) in the Palilula Municipality. At that time, neither the city centre nor the peripheral areas had a modern shopping mall integrated into the urban space.

3 Consumer Spatial Behaviour – Choosing a Shopping Venue

The evolution of the spatial organisation of retail in the city is closely related to the shopping habits and spatial behaviour of consumers. Consumers' choices depend on their demographic (gender, age, household size and type, etc.) and socio-economic features (education, employment status, income, car ownership, etc.), tastes, needs and preferences. Choices also depend on the specific offer and spatial context – the number, location and distance of retail facilities from the place of residence, the movement mode (walking, public transport, etc.), features of stores, prices, choice of goods, quality of service, availability of parking space, etc. (GUY 1999).

According to VAN LEEUWEN and RIETVELD (2011) the factors influencing consumer choices and their spatial behaviour include: consumer features (demographic and socio-economic), supply factors (attractiveness of shops, distance, prices, etc.) and reasons for shopping (supply of food products, entertainment, targeted shopping, etc.). They also highlight the place of work. When associated with primary labour mobility, shopping becomes a significant secondary activity that takes place near the workplace or on the way to work (PAPADOPOULOS 1980; FINDLAY et al. 2001).

Socio-economic status represented by the income level and the degree of motorisation is a very important factor when choosing a retail facility. Those with a lower social status (measured by income or the education level) are more likely to shop in the neighbourhood (MICHEL and SCHEINER 2016). Customers with a car are more likely to travel to remote malls and hypermarkets with abundant parking space, while those without a car choose shopping venues close to the place of residence (BROMLEY and THOMAS 1993; THOMAS and BROMLEY 1996; GARSTKA 2008; CACHINHO 2014).

It has been found (e.g., NOVÁK and SÝKORA 2007; VAN LEEUWEN and RIETVELD 2011) that the key indicators of the spatial shopping behaviour are socio-economic activities (employment, studies, and work from home) and the type of day (working day or week-

end). Employed people mostly go shopping on weekdays near their workplace, on the way home from work, in suburban hypermarkets along their way, or in their neighbourhood. The connection between home and work is the strongest element in the temporal and spatial patterns of residents' activities and it has the greatest impact on the organisation and changes in the structure of the metropolitan area. NOVÁK and SÝKORA (2007) demonstrate that in the morning, most employees take a direct route to work, while the return journey is often interrupted by shopping or leisure activities. One-third of all shopping activities on the way home from work occur in new suburban retail spaces and one-fifth near home.

Several studies (e.g., SMITH 1992; FÖBKER and GROTZ 2006; VOJNOVIC et al. 2020) address the issue of the supply provision for the elderly urban dwellers. This is a significant issue, especially considering the income and mobility constraints this growing population faces. Although the elderly are not a homogeneous group in terms of the socio-economic status and place of residence (e.g., city centre vs. periphery), some regularities can be taken into account. Their spatial choices are the result of the information they have and the criteria they use in evaluating the retail space. Regardless of the part of the city in which they live, the most important attributes of a retail space from the perspective of elderly residents are the distance from home, prices and the presence of a supermarket (SMITH 1992).

The venues targeted by the shopping mobility of the elderly are fairly limited in scope, compared to those targeted by younger residents (e.g., GUY 1985; SMITH 1992) because they have a poorer knowledge of the retail space and shopping opportunities in the city than the younger population. Elderly people are generally well acquainted with the facilities in their neighbourhood and when it comes to distant shopping outlets, perceived distances also come into play. Members of this group are more likely to go on foot or by public transport when shopping, and they use private cars less often.

Spatial mobility patterns are a key element of any geographical study of consumer behaviour (e.g., NOVÁK and SÝKORA 2007; GARSTKA 2008; AKSENOV 2016). They are the result of the spatial variability (distribution) of shopping movements, reflecting the interdependence between the place of residence and the shopping venue (NOVÁK and SÝKORA 2007). Based on the trajectory and especially on the destination of individual movements, it is possible to trace the spatial patterns of shopping activities. Spatial patterns reveal the zones of concentration of shopping and other activities, which are in fact shopping hubs in space (HÄGERSTRAND 1970).

4 Materials and Method

4.1 Data and Research Area

The primary source of data in this research is a survey on the daily local mobility of the residents of 17 municipalities within the City of Belgrade (City Administration of the City of Belgrade, Secretariat for Transport of the City of Belgrade, 2015). This territory consists of 478 traffic zones in total. The survey covered 1–1.5 percent of the population

of each traffic zone, i.e. 19,603 respondents (6+ years) in total. The respondents provided individual demographic and socio-economic data, household data and information about their movements throughout the previous working day (during 24 hours) – namely about the space, time, mode and purpose of movement. The survey was conducted in April and May 2015. No similar research on mobility in Belgrade has been conducted since then.

For the purpose of this research, a sample of 15,006 respondents living in the territory covered by the Belgrade Master Plan was selected. There are 345 traffic zones in this area, located within 12 municipalities – 10 urban and parts of two suburban municipalities. The respondents were divided into two groups: the employed and the non-employed (housewives, retirees and the unemployed) (Table 1). Depending on the dimensions of socio-economic status, leisure time and travel mode, both groups face various possibilities and constraints related to shopping movements (TODORIĆ 2019), which are highly relevant for defining the spatial patterns of shopping mobility.

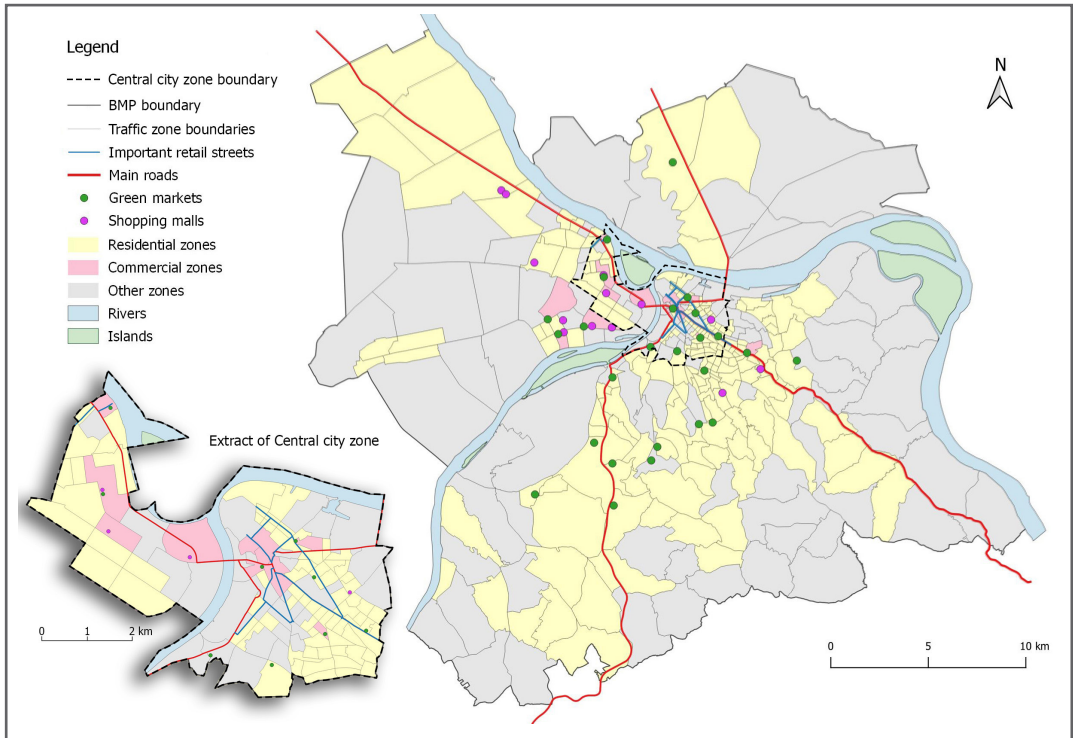
Groups	Number	%	Employment status	Number	%
Employed	7,917	52.8	Permanently employed	6,344	42.3
			Occasional or part-time workers	1,077	7.2
			Self-employed	496	3.3
Non-employed	7,089	47.2	Retirees	4,094	27.3
			Unemployed	2,669	17.8
			Housewives	326	2.2
Total	15,006	100.0			

Source: City Administration of the City of Belgrade, Secretariat for Transport of the City of Belgrade, 2015.

Table 1: Employment status and respondent groups of the survey used in the research

Traffic zones (345 in total) are the main spatial unit in the research (Figure 2). They differ in terms of population and area size, their position within the territory covered by the Belgrade Master Plan (central, middle, outer or boundary zone) and dominant functions (residential, commercial or other). The spatial features of the traffic zones associated with the retail network, the structure of retail outlets, the number of shops and the types of retail outlets within the network are certainly the most relevant in shopping mobility. The analysis of the retail structure in the traffic zones has revealed the importance of individual zones and has made it possible to explain shopping mobility between traffic zones.

Data on the shopping and labour mobility of the respondents within the area covered by the Belgrade Master Plan were used (Table 2). A total of 2,674 daily shopping movements was analysed: 627 (23.4 %) by employed residents and 2,047 (76.6 %) by the non-employed. There were 7,957 labour movements in total: 7,011 (88.1 %) by employed residents and 946 (11.9 %) by the non-employed group.



Source: Authors 2023 (own design), based on Belgrade Master Plan 2003

Figure 2: Traffic zones by dominant function according to Belgrade Master Plan and the main retail structures

Purpose of movement	Employed		Non-employed	
	Number	%	Number	%
Overall	7,638	100.0	2,993	100.0
Primary (labour)	7,011	91.8	946	31.6
Shopping	627	8.2	2,047	68.4

Source: Authors' calculations based on a survey by the City Administration of the City of Belgrade, Secretariat for Transport of the City of Belgrade Secretariat for Transport of the City of Belgrade

Table 2: Movement distribution by purpose per respondent group

This research deals with shopping mobility in the pre-Covid period. Studies on shopping behaviour during the pandemic and especially during the lock-down mainly focus on e-shopping (BECKERS et al. 2021; MOURATIDIS and PAPAGIANNAKIS 2021; YOUNG et al. 2022; SHEN et al. 2022). To the best of the authors' knowledge, no geographical research

on the spatial patterns of shopping movements in this period has been done so far. In this respect, the results of this research, among other things, can be used in future studies for comparisons between the pre- and post-Covid spatial patterns of shopping mobility.

4.2 Spatial Analysis

The spatial analysis of the patterns of residents' labour and shopping mobility is based on the mapping of phenomena (shopping and labour movements) and the interpretation of the obtained maps. The residents' overall shopping and labour mobility and the two components of their movements were mapped: movements between traffic zones (interzonal) and movements within a traffic zone (intrazonal). Interzonal movements may indicate more intensive visits to some areas, more attractive places, at the city level. Intrazonal movements may provisionally be described as neighbourhood mobility. This type of mobility indicates the residents' preference for the nearest local facilities – close to the place of residence. The QGIS software was used to map, analyse and interpret the results.

A base map divided into 345 traffic zones within the boundaries of the Belgrade Master Plan was used. The choropleth method was used to present the mobility data in thematic maps, giving a visually clear idea of the phenomenon and allowing for a relatively simple reading of the map (BURT et al. 2009). The main indicator shown in the maps is the number of visits to each traffic zone for the purpose of shopping or work. With the aim of making the movement patterns of different groups (the employed and the non-employed) comparable, the standard deviation of the number of arrivals was used.

Furthermore, a detailed analysis of traffic zones with a positive value of standard deviation was done. At the same time, we performed a position analysis of traffic zones, as well as a qualitative analysis of traffic zones through the identification of infrastructure and facilities (retail and other facilities and functions), using Google Maps and satellite images. Based on the spatial distribution and the specific features of the visited traffic zones, the overall spatial patterns of movements have been identified and several rules that explain the spatial patterns of shopping movements have been formulated.

5 Spatial Distribution of Shopping Activities in Belgrade

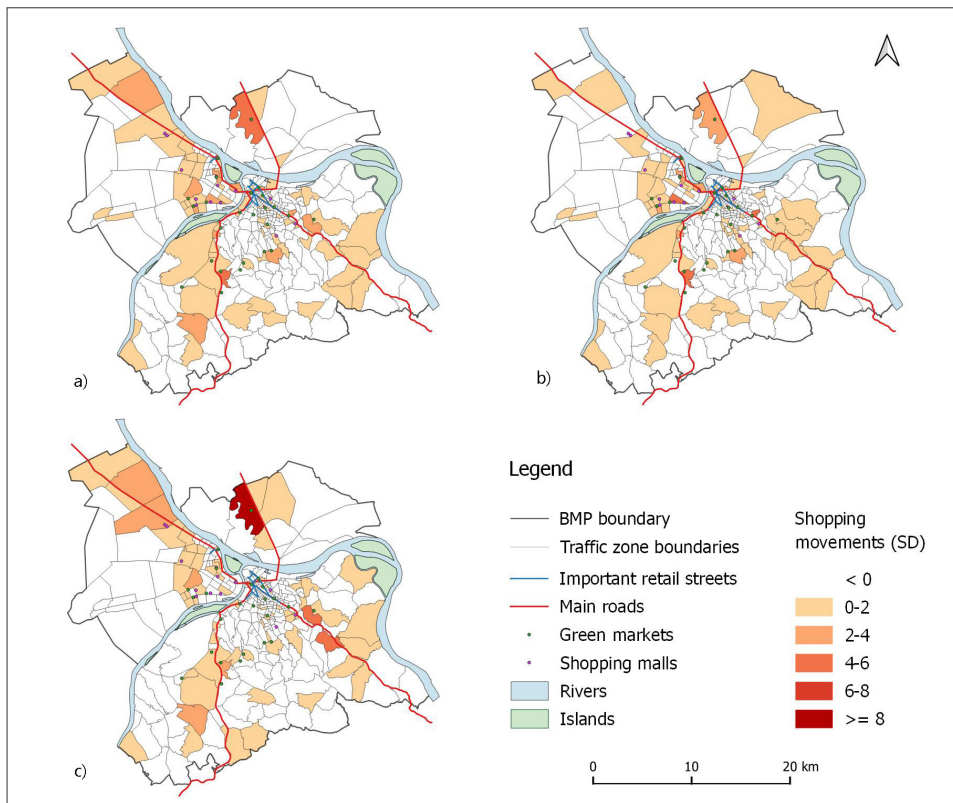
The spatial analysis of shopping mobility seeking to identify the spatial patterns of shopping mobility in Belgrade has made it possible to identify movement directions and scope. The spatial analysis includes the residents' local movements on the territory covered by the Belgrade Master Plan (where the starting point and the destination are within the territory covered by the Master Plan). The first segment of the analysis deals with the overall shopping mobility of the surveyed population, i.e. 2,674 movements in total.

Furthermore, the shopping movements of the two groups were analysed: the employed (627 movements) and the non-employed (2,047 movements), along with the labour mobility (7,011 movements), because it has a major influence on the consumer mobility of the employed. It has been established that interzonal movements have the largest share of

(2,147, i.e. 80.3 %) in the overall shopping mobility, while intrazonal movements account for 19.7 percent (i.e. 527 movements). Accordingly, the component of interzonal mobility is crucial for defining the pattern of the overall mobility.

5.1 General Patterns of Shopping Mobility

Figure 3 shows the spatial patterns of the total shopping movements of the surveyed population, as well as the interzonal and intrazonal movements. The maps show the traffic zones targeted by shopping movements. Standard deviation (SD) values are used to ensure the comparability of different mobility categories. Attention is focused on the zones with a positive standard deviation because they are visited above average.



Source: Adjusted from TODORIĆ 2019

Figure 3: Destination zones of shopping movements: total (a), interzonal (b), intrazonal (c)

The map of the overall shopping mobility (Figure 3a) shows that the location of the visited zones is determined by the routes of the main roads in Belgrade (Batajnica

Road, Ibar Route, Zrenjanin Road and Smederevo Road). These four traffic routes are perceived as Belgrade's "axes of development", along which economic activities are concentrated (RATKAJ 2008; TODORIĆ et al. 2021). The map shows that shopping zones are dispersed in the urban space, i.e., that there are no obvious differences between the city centre and the periphery. Also, some traffic zones have significantly higher SD values than the surrounding area – these are the zones of shopping attraction. This can be explained by their attractiveness due to a greater concentration of retail facilities, diversity of supply, etc.

The zones where shopping is the most intensive (SD values of 6 and higher) are located both in the central urban zone and on the outskirts. In the centre of the city, these are the zones with green markets and a variety of retail facilities. On the outskirts, this zone covers the greatest part of one big neighbourhood (Borča) and is located by a major road with commercial and service facilities distributed along the route. Category SD 2–4 includes 13 zones distributed throughout the city. These are the zones where attractive shopping streets, shopping malls and green markets are located. The zones with the lowest values of standard deviation (SD 0–2) are dispersed throughout the city; green markets can also be found there, but it can be observed that they are grouped along the lines of development "axes" around four major urban traffic routes.

The rules of the spatial distribution of shopping activities that can be defined based on Figure 3a include: the dispersion of shopping spaces throughout the territory covered by the Belgrade Master Plan (and outside the city centre), the position along the main traffic routes, as well as a greater number of shopping visitors at attractive spaces such as green markets, shopping malls and other attractive commercial spaces in the city marked by a higher concentration of retail facilities.

The image showing the interzonal shopping mobility also reveals the dispersion of visited zones (Figure 3b), as well as a general orientation along the lines of major roads, although a higher intensity of visits to more attractive areas in the city is more significant. The zones of shopping attractions normally include areas with green markets and shopping centres, or areas with a higher concentration of retail facilities.

Peripheral zones stand out when it comes to the distribution of intrazonal mobility (Figure 3c), which again indicates the dispersion of shopping activities at the city level. These zones are most commonly located along major traffic routes, or they have a larger population, consequently involving a greater mobility. Due to this, the SD value for the Borča zone exceeds 8. Therefore, two obvious rules can be observed: interzonal mobility defines the zones of shopping attraction in the city, while intrazonal mobility is determined primarily by the zones' population, and, consequently, by the number of shopping movements in the vicinity of the place of residence. Both patterns are marked by a dispersed distribution of visited zones, without the dominance of the city centre.

5.2 Shopping and Labour Mobility of Employed Residents

The connection between labour and shopping mobility is one of the key assumptions in this research. The employed are considered to be more mobile than the non-employed

because they usually have to undertake primary movements. Their financial status is more favourable and they are mostly in the life stage when they take care of the household and supplies – both financially and practically. Therefore, labour and shopping movements of employed residents are analysed in parallel and attention is focused on understanding the spatial similarity of the patterns of the two types of mobility. The data (Table 3) show that the relative share of intrazonal movements associated with shopping is greater than the share of labour mobility, which speaks in favour of the assumption that the orientation of shopping is prevalently local.

Purpose of movements	Total movements		Interzonal		Intrazonal	
	Number	%	Number	%	Number	%
Labour	7,011	100.0	6,600	94.1	411	5.9
Shopping	627	100.0	511	81.5	116	18.5

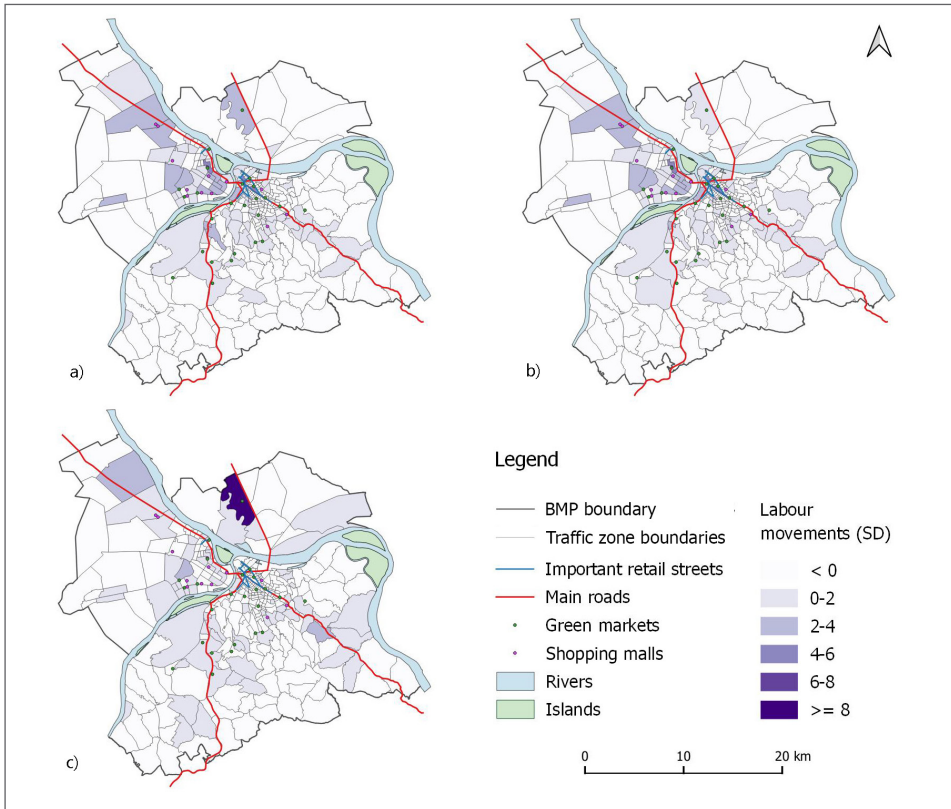
Source: Authors' calculations based on a survey by the City Administration of the City of Belgrade, Secretariat for Transport of the City of Belgrade.

Table 3: Movements of the employed

Labour mobility accounts for 91.8 percent of the employed population's mobility and, as expected, has a significant impact on the spatial patterns of shopping. The obtained results (Figure 4a) reveal the expected pattern of labour movements (RATKAJ 2008) targeting distinct labour centres and zones along the main traffic routes. The zones with a significant share of jobs are mostly concentrated in the central part of the city, to become sparser towards the periphery. Based on this spatial distribution, the centre-periphery rule is defined. The central business zone is reserved for services (quaternary sector), while the share of lower production sectors gradually increases as one moves towards the periphery.

As far as the total labour mobility of employed residents (Figure 4a) is concerned, category SD 4–6, indicating the highest mobility, includes two zones in the urban core and one zone in the centre of New Belgrade. Category SD 2–4 includes 17 zones located in the centre and other parts of the city with developed administrative and educational functions, in the peripheral neighbourhoods where industrial and service activities are developed, and areas with a higher concentration of services (trade, catering and traffic). This is a category where distinct zones of attraction for labour mobility (labour centres) are located.

The group with the lowest SD value (SD 0–2) is the most numerous and widespread; it is continual, radiating from the central zones to NW, SW and SE, coinciding with the distribution of labour zones along the four axes of development (traffic directions). The overall labour mobility is largely determined by the interzonal component (Fig. 4b), where the three rules of labour mobility can also be observed. The values for the intrazonal labour movements of employed residents (Fig. 4c) are steady, with the exception of one peripheral zone (Borča), due to its population size and access to intrazonal functions and jobs.



Source: Adjusted from TODORIĆ 2019

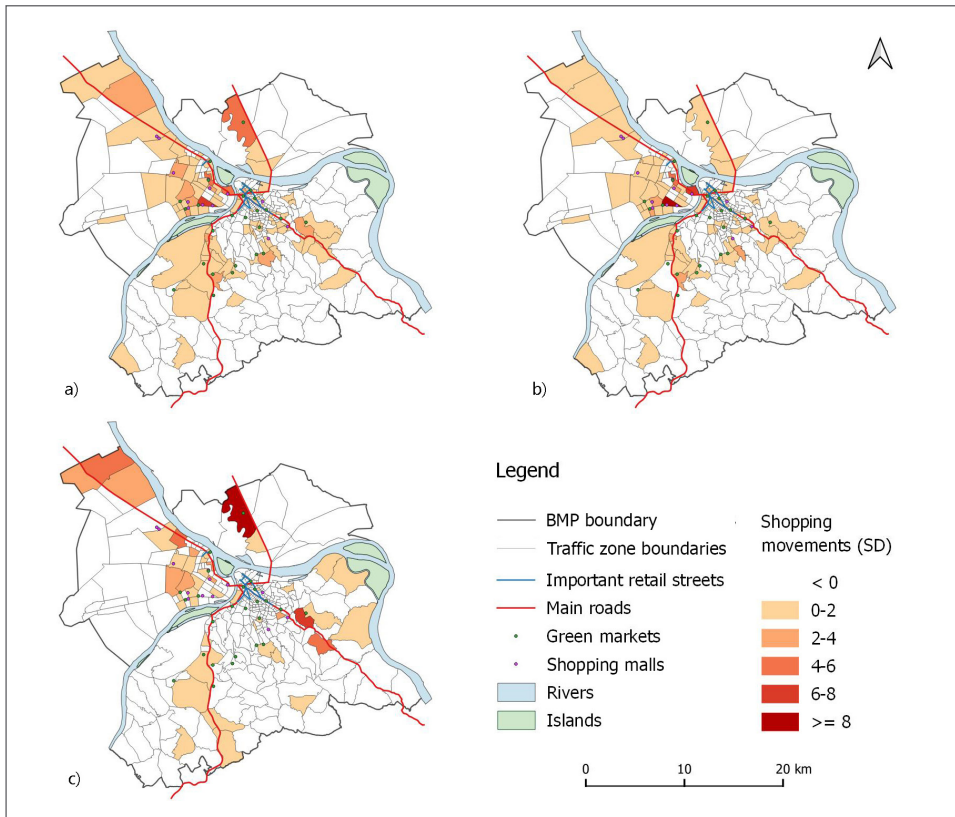
Figure 4: Destination zones of labour movements: total (a), interzonal (b), intrazonal (c)

Figure 5 shows the shopping mobility of employed residents. Apparently, there is a deviation from the pattern of the shopping mobility of the total population – in this case, zones are more centralized, although they do not conform to the centre-periphery rule. Distinct axial routes and attraction zones can also be observed. The shopping pattern largely coincides with the pattern of employed residents' labour mobility. However, it is observed that labour mobility is more centralized, while shopping is more associated with the zones of attraction and more present in the peripheral parts of the city.

As far as the overall shopping mobility of employed residents (Figure 5a) is concerned, there is only one zone with SD 6, in New Belgrade (where two shopping centres are located). Category SD 4–6 includes two zones in New Belgrade where shopping centres are located, as well as a large zone, in terms of population size and access to amenities, on the left bank of the Danube (Borča). The majority of zones (14) fall into the SD 2–4 group. These are the zones in the very centre of the city and the so-called “secondary” centres (of labour and shopping), where shopping malls,

green markets, attractive shopping streets and megamarkets are located. The zones falling into the SD 0–2 group are distributed throughout the city, but primarily along the four major roads.

As expected, the interzonal shopping movements of employed residents (Figure 5b) are guided by the rules of attraction zones and an axial distribution of zones, while the pattern of centrality is missing. The intrazonal shopping movements of the employed (Fig. 5c) are in this case observed in the zones of attraction, as well as in the neighbourhoods with a large population size and a good access to amenities.



Source: Adjusted from TODORIĆ 2019

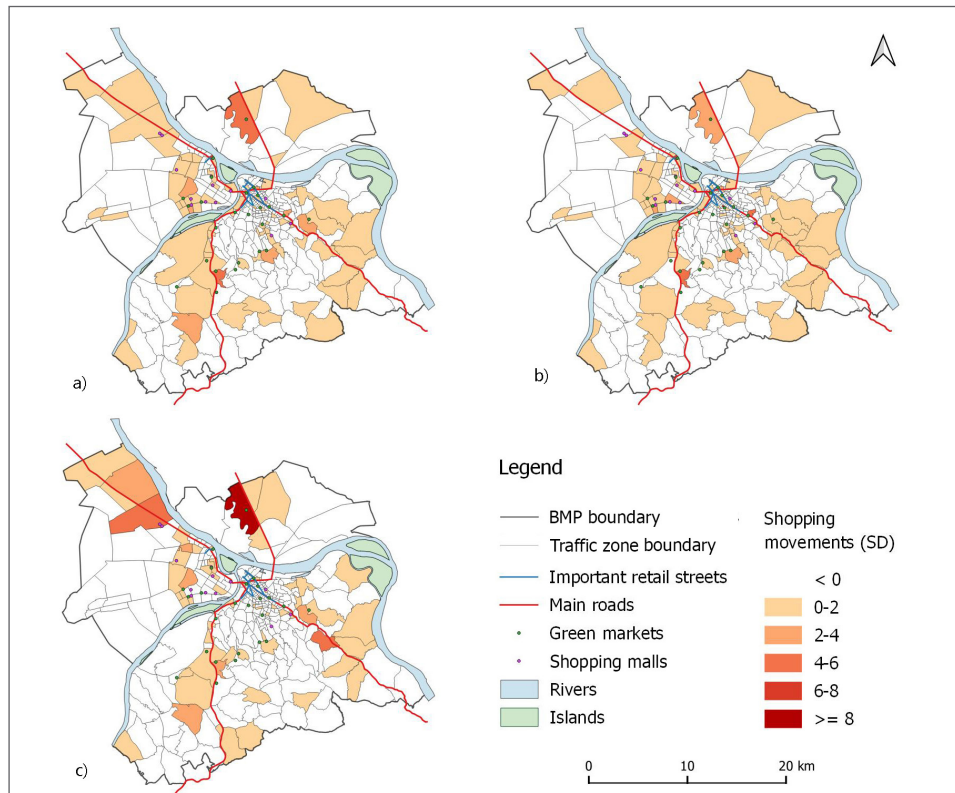
Figure 5: Destination zones of shopping movements of the employed: total (a), interzonal (b), intrazonal (c)

It can be concluded that the spatial patterns of shopping and labour movements coincide only partially, in the zones that are both labour centres and areas attractive for consumption (either because of the presence of attractive sites, or due to a good access to amenities, which is usually associated with the population size of the neighbourhood).

5.3 Shopping Mobility of the Non-Employed

The pattern of the overall shopping mobility of the non-employed (Figure 6a) is very similar to the pattern of the overall shopping mobility of all respondents, which means that the data for this group significantly influenced the picture of the overall shopping mobility. However, it has been demonstrated that the shopping patterns of the non-employed are different from those of employed residents. The zones with green markets and a good retail network have the same function for the non-employed as the zones with shopping centres for the employed.

The map of the overall shopping mobility of the non-employed (Figure 6a) shows that the centre of Zemun falls into the category with the highest SD (6–8). It is followed by two peripheral zones with a large population and a good retail network (Borča and Vidikovac, SD 4–6). Nine zones fall into the SD 2–4 category, distributed throughout the



Source: (a) Authors, based on a survey by the Secretariat for Transport; (b) and (c) adjusted from TODORIĆ 2019

Figure 6: Destination zones of shopping movements of the non-employed: total (a), interzonal (b), intrazonal (c)

city: in the city centre, as well as in other more densely populated parts of the city with a good access to amenities. The zones falling into the SD 0–2 category are very distinct, especially in the peripheral parts of the city, where they often take shape of belts. They also include attraction zones with shopping malls or attractive shopping streets. Apparently, the most attractive for the non-employed (housewives, retirees and the unemployed) are zones with a better access to amenities, where green markets can also be found.

As opposed to the shopping mobility of the employed, which is primarily determined by the zones of attraction, this pattern is less pronounced in the non-employed group. Also, the centre-periphery pattern, which is poorly represented among the employed, is even less distinct in the non-employed group. The distribution along development axes can also be observed in the non-employed group. Decentralisation (polycentricity or dispersion) seems to be a general rule relating to shopping, and it is most pronounced in the non-employed group, as the primary movements in this group are negligible. The rule of attraction zones is also a general rule, although it is less distinct in the non-employed group, probably due to local (close to the place of residence) retail facilities in the peripheral neighbourhoods with a good access to amenities.

The analysis of the interzonal shopping mobility of the non-employed (Figure 6b) reveals significant overlaps with the overall shopping mobility of the whole non-employed group. A zone with a green market in the very centre of the city (Kalenić Market) is the only zone where SD is over 8. In other categories, it is possible to find distinct, attractive shopping areas in the centre, while other parts of the city are marked by the presence of green markets, shopping malls or concentrations of other retail facilities.

In contrast, the map of intrazonal movements (Figure 6c) shows a completely different situation. The Borča zone stands out prominently (SD over 8), as a peripheral neighbourhood and the zone with the largest population size and a good retail network. There are no zones in the SD 6–8 category. In categories SD 4–6 and SD 2–4, we find similar zones with a large population, located outside the city centre. Other zones (SD 0–2) are distributed in all municipalities. These are “market” or peripheral zones. Therefore, the population size of the zone and a good access to amenities are a valid explanation of intrazonal mobility in this case as well.

6 Discussion and Conclusions

Over the past two decades, the retail network in Belgrade has changed significantly. The economic indicators, the residents’ purchasing power, and consumer preferences have also changed. This research contributes to a better understanding of the relationship between space and the residents’ shopping behaviour by analysing the shopping mobility of two different socioeconomic groups, employed and non-employed. Special attention is paid to analysing traffic zones as shopping destinations within the boundaries of the Belgrade Master Plan. Identifying traffic zone specificities and shopping attractiveness allowed drawing conclusions and determining regularities in the shopping movements.

Based on the results of the analysis it is possible to formulate general spatial rules of shopping mobility in Belgrade. The research shows that spatial shopping patterns are

determined by some regularity in the spatial distribution of this activity and it identifies attractive shopping areas (spots or zones of attraction) in the city. The spatial analyses of the overall shopping movements (including both groups) show that the rules of infrastructural predisposition (main roads as development axes), dispersion (polycentricity) and attraction zones are relevant to the interzonal component.

The centre-periphery rule is not effective in this context which confirms the importance of the local shopping mobility. Moreover, the opposite has been observed – dispersion (due to local shopping) is the most important feature of shopping mobility patterns. Accordingly, shopping attraction zones are distributed throughout the city. These are mostly areas with green markets and shopping malls, or those with a higher concentration of retail facilities (streets, neighbourhoods, city parts, settlements). Intrazonal shopping movements are also grouped along roads and are decentralised. Both rules of intrazonal movements apply to these areas: the population size of the zone and the intrazonal facility infrastructure.

The shopping mobility of the employed group is determined by the same rules as those for overall movements. However, the divergence between group's labour and shopping movements is observed. Unlike labour movements which mainly gravitate to central city locations, the shopping movements of employed residents mainly target attraction zones and are more prevalent in the peripheral parts of the city. The spatial patterns of shopping and labour movements indisputably overlap only in terms of the distribution along the development axes.

Labour mobility conforms to the centre-periphery rule, while shopping mobility follows the rule of dispersion (polycentricity). Zones (spaces) of attraction are noticeable in both cases, but they do not coincide with each other – both movements have their own attraction zones. Spatial coincidence occurs when the spaces of labour attraction are at the same time spaces attractive for shopping, i.e. in the city centre. Such overlaps occur either due to the presence of attractive retail facilities in the “labour” zones or due to the multifunctionality of some traffic zones, which is most commonly related to the size of the neighbourhood. Therefore, the overlaps of shopping and labour mobility occur only provisionally. These regularities indicate that the functional connection between work and shopping is not as strong as the connection between housing and shopping.

The shopping mobility of the non-employed group (retirees, the unemployed and housewives) significantly influences the picture of the overall shopping mobility since it reveals a very similar pattern. However, it differs from the shopping patterns of the employed. For the non-employed group, the most prominent rule is the decentralisation of shopping (in terms of overall and interzonal mobility), while the attraction zones are not only less pronounced but also different from the attraction zones of the employed. The third rule of the distribution along development axes can also be observed. As for the intrazonal mobility, the population size of the zone and the intrazonal access to retail facilities are also valid explanations.

A particularly distinctive feature of the shopping movements of the non-employed are visits to attractive zones with green markets. This can be explained by the prevalence of retirees in the consumer structure, whose habits are traditionally related to green markets. Since their movements predominantly occur on working days, it is clear that their

shopping mobility has greatly influenced the pattern of the overall shopping mobility. Attraction zones would likely have differed during the weekend, and shopping malls would have gained greater importance. In such a pattern, the employed would probably have contributed to more massive visits to shopping malls and green markets. The impact of their shopping mobility would have been more prominent. Considering the lack of the primary movements, the non-employed group would have probably behaved the same.

The findings of our research are in line with previous studies (e.g., NOVÁK and SÝKORA 2007; VAN LEEUWEN and RIETVELD 2011; RASOULI and TIMMERMANS 2013), according to which shopping movements predominantly take place in the vicinity of the place of residence. The argument that consumers most frequently choose well-known shops, at well-known sites, or along the routes that they regularly visit, and which they find considerably more attractive than the other facilities not involving these factors (MARJANEN 1997), also speak in favour of the local mobility and shop choices. When choosing a shop or a shopping venue, cognitive or perceived distances are more important than real ones because consumers follow their own perception (CADWALLADER 1975).

Earlier research on consumer spatial behaviour in Belgrade (TODORIĆ 2019; TODORIĆ et al. 2022) indicates that shopping mobility involves a greater share of intrazonal movements (19.8 %) than leisure or recreation mobility (about 11.0 %). This also suggests that shopping activity is mostly locally oriented. This rule is easy to explain because shopping movements are the “primary” consumer movements that help meet the need for the supply of daily necessities. Although the central city area stands out in the spatial structure of retail outlets, the results do not indicate its attractiveness in terms of shopping trends. On the contrary, dispersed retail is proven to be more significant, at least on working days. As far as shopping is concerned, the peripheral parts of the city (neighbourhoods) are not dependent on the city centre, especially in the case of settlements with a large population (e.g. Borča). This is indicative of the quality of life in these neighbourhoods, which offer opportunities for both shopping and entertainment, as already demonstrated by previous research (TODORIĆ et al. 2022). This will affect the further polycentric development of the city.

The example of Belgrade shows that shopping malls have not taken prevalence in the city’s shopping space. On the contrary, neighbourhood shops and markets, which are part of the traditional retail network, remain attractive and resist modern changes. The bearers of this shopping pattern are certainly the non-employed residents. These conclusions can provide guidance for planners and developers. Strengthening the retail network of small shops in residential areas would be an advantage for local customers (especially for retirees) whose supply would be facilitated, and this would certainly bring positive economic effects.

7 References

- AKSENOV K. E. (2016): Evolution of the Types of Shopping and Spatial Organization of Retail Trade in the Post-Soviet Metropolis. In: *Regional Research of Russia*, 6 (4), pp. 375–386. – <https://doi.org/10.1134/S2079970516040043>.

- Beckers J., WEEKX S., BEUTELS P., VERHETSEL A. (2021): COVID-19 and Retail: The Catalyst for E-Commerce in Belgium? In: *Journal of Retailing and Consumer Services*, 62, article no. 102645. – <https://doi.org/10.1016/j.jretconser.2021.102645>.
- Božić, V. (ed.) (1991): *Strategija razvoja trgovine Beograda* [Belgrade trade development strategy]. Beograd: Ekonomski fakultet u Beogradu – Naučno-istraživački centar [Faculty of Economics in Belgrade – Scientific Research Center].
- BROMLEY R. D., THOMAS C. J. (1993): The Retail Revolution, the Carless Shopper and Disadvantage. In: *Transactions of the Institute of British Geographers*, 18 (2), pp. 222–236. – <https://doi.org/10.2307/622364>.
- BURT J. E., BARBER G. M., RIGBY D. L. (2009): *Elementary Statistics for Geographers*. Third edition. New York: The Guilford Press.
- CACHINHO H. (2014): Consumerscapes and the Resilience Assessment of Urban Retail Systems. In: *Cities*, 36 (1), pp. 131–144. – <https://doi.org/10.1016/j.cities.2012.10.005>.
- CADWALLADER M. (1975): A Behavioural Modal of Consumer Spatial Decision Making. In: *Economic Geography*, 51 (4), pp. 339–349.
- CLARKE D. B. (2003): *The Consumer Society and the Postmodern City*. London: Routledge.
- DOLEGA L., PAVLIS M., SINGLETON A. (2016): Estimating Attractiveness, Hierarchy and Catchment Area Extents for a National Set of Retail Centre Agglomerations. In: *Journal of Retailing and Consumer Services*, 28 (1), pp. 78–90. – <https://doi.org/10.1016/j.jretconser.2015.08.013>.
- EVERS D., VAN HOORN A., VAN OORT F. (2005): *Winkelen in Megaland*. Rotterdam: NAI Uitgevers; Den Haag: Ruimtelijke Planbureau.
- EYMAN A. (1995): *Consumers' Spatial Choice Behavior*. Heidelberg: Physica-Verlag.
- FINDLAY A., STOCKDALE A., FINDLAY A. M., SHORT D. (2001): Mobility as a Driver of Change in Rural Britain: An Analysis of the Links between Migration, Commuting and Travel to Shop Patterns. In: *International Journal of Population Geography*, 7 (1), pp. 1–15. – <https://doi.org/10.1002/ijpg.201>.
- FÖBKER S., GROTZ R. (2006): Everyday Mobility of Elderly People in Different Urban Settings: The Example of the City of Bonn, Germany. In: *Urban Studies*, 43 (1), pp. 99–118. – <https://doi.org/10.1080/00420980500409292>.
- GARSTKA G. J. (2008): *The Changing Everyday Geographies of Consumption Related Mobility in the Post-socialist Bulgarian City*. Master's thesis, Oxford (Ohio): Miami University.
- GORTER C., NIJKAMP P., KLAMER P. (2003): The Attraction of Out-Of-Town Shopping Malls: A Case Study on Run-Fun Shopping in the Netherlands. In: *Tijdschrift voor Economische en Sociale Geografie*, 94 (2), pp. 219–229. – <https://doi.org/10.1111/1467-9663.00250>.
- GUY C. (1985): The Food Shopping Behaviour of Disadvantaged Consumers: Some Results from the Cardiff Consumer Panel. In: *Transactions of the Institute of British Geographers*, New Series, 10 (2), pp. 181–190.
- GUY C. (1999): Retail Location Analysis. In: PACIONE M. (ed.): *Applied Geography: Principles and Practice*. London: Routledge, pp. 450–462.
- HÄGERSTRAND T. (1970): What About People in Regional Science?. In: *Papers of the Regional Science Association*, 24, pp. 6–21. – <https://doi.org/10.1007/BF01936872>.
- HENSHER D. A., ROSE J. M., GREENEW H. (2005): *Applied Choice Analysis: A Primer*. Cambridge: Cambridge University Press.
- HIRT S. (2008): Landscapes of Postmodernity: Changes in the Built Fabric of Belgrade and Sofia Since the End of Socialism. In: *Urban Geography*, 29 (8), pp. 785–810. – <https://doi.org/10.2747/0272-3638.29.8.785>.

- Office for Informatics and Statistics [Zavod za informatiku i statistiku] (2005): Statistički godišnjak Grada Beograda [Statistical Yearbook of the City of Belgrade]. Belgrade: Zavod za informatiku i statistiku [Office for Informatics and Statistics].
- Office for Informatics and Statistics (2021): Belgrade in Figures. Belgrade: Zavod za informatiku i statistiku [Office for Informatics and Statistics].
- JACKSON P., THRIFT N. (1995): Geographies of Consumption. In: MILLER D. (ed.): Acknowledging Consumption: A Review of New Studies. London: Routledge, pp. 204–237.
- JAYNE M. (2006): Cities and Consumption. London: Routledge.
- KREJA K. (2006): Spatial Imprints of Urban Consumption: Large-Scale Retail Development in Warsaw. In: TSENKOVA S., NEDOVIĆ-BUDIĆ Z. (eds.): The Urban Mosaic of Post-Socialist Europe. Heidelberg: Physica Verlag Springer, pp. 253–272. – https://doi.org/10.1007/3-7908-1727-9_13.
- KUNC J., FRANTÁL B., TONEV P., SZCZYRBA Z. (2012): Spatial Patterns of Daily and Non-Daily Commuting for Retail Shopping: The Case of the Brno City, Czech Republic. In: Moravian Geographical Reports, 20 (4), pp. 39–54.
- LOVRETA S. (1986): Trgovina u savremenim tržišnim uslovima: Komparativna analiza [Trade in modern market conditions: Comparative analysis]. Beograd: Ekonomska politika.
- LOVRETA, S. (ed.) (2008). Strategija razvoja trgovine Grada Beograda [Trade Development Strategy of the City of Belgrade]. Belgrade: Univerzitet u Beogradu – Ekonomski fakultet, Naučno-istraživački centar Ekonomskog fakulteta – NICEF [University of Belgrade – Faculty of Economics, Scientific Research centre of the Faculty of Economics].
- MACURA V. (1984): Čaršija i gradski centar: razvoj središta varoši i grada Srbije XIX i prve polovine XX veka [Bazaar and City Centre: Development of Central Districts of Serbian Towns and Cities in the 19th and first half of the 20th Century.]. Niš i Kragujevac: Gradina i Svetlost.
- MARJANEN H. (1997): Distance and Store Choice with Special Reference to Out-of-Town Shopping. Doctoral Thesis. Turku: School of Economics and Business Administration.
- MICHEL D., SCHEINER J. (2016): Travel Mode Choice of Shopping Centre Customers in Germany: Spatial and Sociodemographic Structures. In: Erdkunde, 70 (4), pp. 323–339. – <https://doi.org/10.3112/erdkunde.2016.04.03>.
- MILES S. (2010): Spaces for Consumption. Pleasure and Placelessness in the postindustrial City. London: Sage Publishers.
- MOURATIDIS K., PAPAGIANNAKIS A. (2021): COVID-19, Internet, and Mobility: The Rise of Telework, Telehealth, E-Learning, and E-Shopping. In: Sustainable Cities and Society, 74, article no. 103182. – <https://doi.org/10.1016/j.scs.2021.103182>.
- NAGY E. (2001): Winners and Losers in the Transformation of City Centre Retailing in East Central Europe. In: European Urban and Regional Studies, 8 (4), pp. 340–348. – <https://doi.org/10.1177/096977640100800406>.
- NOVÁK J., SÝKORA L. (2007): A City in Motion: Time-Space Activity and Mobility Patterns of Suburban Inhabitants and the Structuration of the Spatial Organization of the Prague Metropolitan Area. In: Geografiska Annaler. Series B, Human Geography, 89 (2), pp. 147–168. – <https://doi.org/10.1111/j.1468-0467.2007.00245.x>.
- PAPADOPOULOS N. G. (1980): Consumer Outshopping Research: Review and Extension. In: Journal of Retailing, 56 (4), pp. 41–59.
- PARYSEK J. J., MIERZEJEWSKA L. (2006): City Profile: Poznan. In: Cities, 23 (4), pp. 291–305. – <https://doi.org/10.1016/j.cities.2006.04.001>.
- RASOULI S., TIMMERMANS H. J. P. (2013): Assessment of Model Uncertainty in Destinations and Travel Forecasts of Models of Complex Spatial Shopping Behaviour. In: Journal of Re-

- tailoring and Consumer Services, 20 (2), pp. 139–146. – <https://doi.org/10.1016/j.jretconser.2012.05.001>.
- RATKAJ I. (2008): Defining the Centers of Labor in Urban Area: Example of Belgrade. In: Zbornik radova - Geografski fakultet Univerziteta u Beogradu [Proceedings – Faculty of Geography, University of Belgrade], 56, pp. 117–130.
- SHEN H., NAMDARPOUR F., LIN J. (2022): Investigation of Online Grocery Shopping and Delivery Preference Before, During, and After COVID-19. In: Transportation Research Interdisciplinary Perspectives, 14, article no. 100580. – <https://doi.org/10.1016/j.trip.2022.100580>.
- ŠIĆ M. (2007): Prostorske in funkcijske spremembe v novejšem urbanem razvoju Zagreba [Spatial and Functional Changes in Recent Urban Development of Zagreb]. In: Dela, 27 (1), pp. 5–15. – <https://doi.org/10.4312/dela.27.1.5-15>.
- SMITH G. C. (1992): The Cognition of Shopping Centers by the Central Area and Suburban Elderly: An Analysis of Consumer Information Fields and Evaluative Criteria. In: Urban Geography, 13 (2), pp. 142–163. – <https://doi.org/10.2747/0272-3638.13.2.142>.
- SÝKORA L., KAMENICKÝ J., HAUPTMANN P. (2000): Changes in the Spatial Structure of Prague and Brno in the 1990s. In: Acta Universitatis Carolinae Geographica, 35 (1), pp. 61–76.
- STANILOV K. (ed.) (2007): The Post-Socialist City: Urban Form and Space Transformations in Central and Eastern Europe After Socialism. Dordrecht: Springer.
- THOMAS C. J., BROMLEY R. D. F. (1996): Safety and Shopping: Peripherality and Shopper Anxiety in the City Centre. In: Environment and Planning C: Government and Policy, 14 (4), pp. 469–488. <https://doi.org/10.1068/c140469>.
- TODORIĆ J. (2019): Prostorni obrasci ponašanja potrošača u Beogradu [Spatial Behaviour Patterns of Consumers in Belgrade]. PhD dissertation. Belgrade: University of Belgrade – Faculty of Geography.
- TODORIĆ J., YAMASHKIN A., VUKSANOVIĆ-MACURA Z. (2022): Spatial Patterns of Entertainment Mobility in Cities. In: Journal of the Geographical Institute “Jovan Cvijić” of the Serbian Academy of Sciences and Arts (SASA), 72 (2), pp. 207–220. – <https://doi.org/10.2298/IJGI2202207T>.
- VAN LEEUWEN E. S., RIETVELD P. (2011): Spatial Consumer Behaviour in Small and Medium-sized Towns. In: Regional Studies, 45 (8), pp. 1107–1119. – <https://doi.org/10.1080/00343401003713407>.
- VOJNOVIĆ I., LIGMANN-ZIELINSKA A., LEDOUX T. F. (2020): The Dynamics of Food Shopping Behavior: Exploring Travel patterns in Low-Income Detroit Neighborhoods Experiencing Extreme Disinvestment Using Agent-Based Modeling. In: PLOS ONE, 15 (12), article no. e0243501. – <https://doi.org/10.1371/journal.pone.0243501>.
- ВУКСАНОВИЋ-МАЦУРА З., ТОДОРИЋ Ј. [VUKSANOVIĆ-MACURA Z., TODORIĆ J.] (2019): Урбанизација и промена просторних образаца трговине у Србији у 19. Веку [Urbanization and Changes in Spatial Patterns of Trade in Serbia in the 19th Century]. In: У С. Рудић, А. А. Гордин (ур.) [RUDIĆ S, GORDIN A. A. (eds.)]: Међународни научни скуп: Урбанизација у Источној и Југоисточној Европи, Београд, 26. октобар 2018 [International Scientific Conference: Urbanization in Eastern and Southeastern Europe. Belgrade, 26 October 2018]. Београд: Историјски институт; Нижњи Новгород: Државни универзитет за архитектуру и грађевину [Belgrade: Institute of History; Nizhny Novgorod: State University of Architecture and Construction], pp. 197–216, ISBN: 978-86-7743-134-1.
- WILLIAMS P., HUBBARD P. (2001): Who is Disadvantaged? Retail Change and social Exclusion. In: International Review of Retail, Distribution and Consumer Research, 11 (3), pp. 267–286.

YOUNG M., SOZA-PARRA J., CIRCELLA G. (2022): The Increase in Online Shopping During COVID-19: Who is Responsible, Will it Last, and What Does it mean for Cities? In: *Regional Science Policy & Practice*, 14 (51), pp. 162–178. – <https://doi.org/10.1111/rsp3.12514>.