Piotr Gibas, Małgorzata Twardzik

Department of Spatial Economics, University of Economics in Katowice, Poland (PL)

Spatial analysis of commercial services in Poland

1. Introduction

Trade is one of the most important sectors of national economy in Poland and an essential market component both on regional and local scale. It is also a vital element of expanded distribution system and thus it affects the quality of people's life while satisfying their consumer needs in the sphere of buying goods in convenient time, place and conditions guaranteeing high quality of provided services [Ciechomski 2010, p.14]. The city remains a natural environment of commercial activity[1] as development processes constantly proceed there, new consumer needs occur and new trade forms (e.g. large selling area super and hypermarkets as well as shopping malls) emerge there. Commercial activity depends on other city functions, including communication as well as social and economic functions, thus it directly affects the shaping of majority of functional elements in the city and conditions of its competitiveness as the centre in settlement system.

Distribution of commercial outlets in a given area determines availability of goods and creates conditions for efficient provision of services for residents. The paper is a statistical and spatial analysis of commercial services in Poland, and for this purpose it applies information gained from Database of Topographic Objects of 2015. The list of buildings of commercial function (or commercial and service-providing function) became the basis for the diagnosis of commercial availability in Poland.

Commercial and service-providing activity is usually located according to market criteria and takes into consideration the size of settlement unit, economic and financial situation, transport conditions and residents' preferences. Therefore, in Poland, yet not only there, the largest cities and agglomerations offer the best conditions for development of commercial and service providing chains. The assumption is confirmed by the results of conducted statistical and spatial analysis which shows that over 30% buildings of commercial and service-providing purpose are located in the largest cities and in municipalities forming the heart of

[1] In this case, commercial activity represents trade in institutional approach, i.e. all commercial enterprises the activity of which consists exclusively or primarily in purchase of goods for the purpose of their further resale. It takes place in retail and wholesale outlets. More on the subject in: M. Sławińska, Handel we współczesnej gospodarce. Kompendium wiedzy o handle [*Trade on contemporary economy. Compendium of knowledge about trade*], publisher: PWN, Warsaw, pp.14-15.

urban functional areas in the capital cities of voivodeships. According to classical theory of services, location and distribution of individual categories of goods is based on the principle of hierarchy[2]. Distribution of commercial services in Poland is highly correlated with the distribution of settlement and transport network, as well as economic (income) conditions in the country. Presented results of statistical and spatial analysis constitute the introduction for further in-depth studies in this sphere.

2. Theoretical background and literature review

Trade is the subject of interest of many areas of science, such as geography, economics, marketing, sociology or urban planning. Studies of trade in Poland mostly refer to functioning of traditional commercial chains and usually concern location of outlets, their assortment, scope of activity and service for customers/residents of a given area (including for example planning of commercial chain for a given city or settlement). Political changes caused far-reaching proprietary, quantitative and qualitative consequences in the structure of retail trade chains. New types of outlets occurred, assortment offer expanded, and new ways of distribution and sale were implemented (including e-trade) as well as new customer service methods (Sławińska 2008, Szumilak 2004, Sondej 2005).

For many years, trade has been the subject of spatial studies that mainly concerned the analysis of development of new retail trade format and distribution of commercial and service-providing chains in the structure of a given city (D. Kociuba 2006 – example of Lublin, B. Namyślak 2006; S. Ciok, D. Ilnicki 2011 – example of Wroclaw, J. Dzieciuchowicz 2012, A. Rochmińska 2005, 2010, 2013 – example of Lodz, M. Twardzik 2007, 2015, Heffner, Twardzik 2013, K. Kłosowski 2002 – cities of Upper Silesian Agglomeration, J. Więcław 2000, 2003 - Kraków, T. Kaczmarek 2010, 2011 – Poznan, M. Fuhrmann 2009, Dudek-Mańkowska, 2009 – example of Warsaw). Most frequently addressed subjects in the sphere of spatial analyses comprise such issues as the hierarchy of cities in commercial chains, including the application of the concept of network for studies of services (Wilk 2005, Kaczmarek 2010, 2011), studies of transport accessibility of commercial chains in selected areas (Zipser 2006, Fularz 2004, Dybicz 2001, Kowalski, Wiśniewski 2017),

[2] Hierarchy – order, sequence, refers to differentiation between individual elements on the principle of ranking from the most important to the least important, from the biggest to the smallest. More on this subject at : https://sjp.pwn.pl/slowniki [22.08.2018].

integration and spatial concentration of trade (Kłosiewicz – Górecka 2006, Pokorska, Maleszyk 2002, Maleszyk 2011), importance of trade in development of suburbanisation process and appropriation of public space by new trade formats (e.g. shopping and service-providing centres) (Janiszewska, Klima, Rochmińska 2011, Mironowicz 2010, Pancewicz 2010). Recent decade of spatial studies on trade concerns mainly new large-selling area formats, mostly shopping centres and discount chains that considerably affect the structure of the sector in Poland. Growing process of concentration and integration in trade leads to decline in the number of traditional stores, especially in the areas of intensified market competition and chain formation (integrated chains, franchising) as well as visual unification (Ciechomski 2010, Kucharska, Twardzik 2007, Borusiak 2008).

In many countries in Europe and the USA studies concerning qualitative changes that occur in urban service-providing network in relation to realisation of commercial buildings, distribution of commercial chain in a given area are conducted on a large scale, and main researchers working on this issue include C. Guy (Gay 1998, 2007), N. Wrigley (Wrigley et al. 2007, Wrigley & Lambiri 2014) or Franke (Franke 2007), Pump-Uhlmanna (Pump-Uhlmann 2006) and many others. The studies usually focus on location of commercial outlets in urban space, accessibility (transport) of trade for customer, selection of assortment offer and innovations in trade.

Conducted statistical and spatial analysis with the use of information obtained from Database of Topographic Objects that includes the list of buildings performing commercial function (or commercial and service-providing function) is a method of diagnosis of commercial accessibility in Poland that has not been applied before.

3. **Research method**

The basis for calculations were centroids over 14.7 million buildings constituting one of the layers of the Database of Topographic (BDOT10k[3]) according to the 2015 update. Centroids were determined in the QGIS ver. 2.14.3 Essen[4]. The area of the whole country was analyzed in the administrative system of communes (according to the PRG data),

[3] The structure of the database is described in the item: Opis bazy danych topograficznych i ogólnogeograficznych oraz standardy techniczne tworzenia map. Załącznik do rozporządzenia Ministra Spraw Wewnętrznych i Administracji z 17 listopada 2011 r w sprawie bazy danych topograficznych oraz bazy danych ogólnogeograficznych a także standardowych opracowań kartograficznych. Tom I. Dz. U. załącznik do nru 279, poz. 1642 27 grudnia 2011 r., more about creating this database: Rola bazy danych obiektów topograficznych w tworzeniu infrastruktury informacji przestrzennej w Polsce, D. Olszewski, D. Gotlib (ed.) Główny Urząd Geodezji i Kartografii, Warszawa 2013

[4] The possibilities of using GIS in the study for retail location assessment are analyzed by A. Abdulkader (2015)

provinces and in accordance with the classification proposed in the work of P. Gibas and K. Heffner (2018).

The basis for calculations was the appointment of the orthodrome (the shortest Euclidean connections) between residential buildings covering the category of single-family housing (1110), two-family dwellings (1121), housing buildings with three or more apartments (1122) and collective housing housing (1130) and commercial buildings - services (1230). Then a typical area of variability was determined (the national orthodrome average increased by the standard deviation) thus determining the areas with difficult access to the retail and service network. In order to better visualize the distances that exist, supra-range values were presented in the above and below the median of supra-range value (its value in meters was shown in the legend of figures). It should be noted that spatial measures based on the shortest distance are particularly used in urban pattern dispersion tests (Reis J. P. et al. 2015, Herold et al. 2003, Gibas P. 2017).

4. Research results

In Poland, according to the Topographic Object Data Bank (BDOT10k), in 2015, there were 225 757 commercial and service buildings located (1.53 percent of all buildings). The most represented group of retail and service pavilions constituted up to 80.22 percent of the number of commercial and service buildings. The following categories are: department stores or commercial (constituting 8.39 percent of the number of buildings described), petrol stations (3.26 percent), pharmacies (2.47 percent), hypermarkets or supermarkets (1.35 percent), vehicle service stations (0.89 percent), shopping centers (0.26 percent), market halls and exhibition halls (respectively: 0.11 and 0.05 percent). The remaining 3 percent of these buildings also have other functions, including service headquarters (0.73 percent), residential (0.6 percent), serving as bank (0.54 percent) restaurants (0.53 percent). In general, the distribution of commercial and service buildings coincides with the network of Polish cities and towns.

Generally, these buildings are located in large cities (32.36 percent of them). It can be noticed, however, that only 24.76 percent of them are located in peripheral systems. The direct and indirect zones of the impact of the big city cover a further 24.13 percent of the buildings described, while the areas closely related to the large city are 18.76 percent (see Table 1). It is also possible to notice the concentration of these buildings in relation to each other in peripheral systems, the average distance between these buildings is 204.73

meters with a standard deviation of 306.88 meters (for comparison in large cities, the distance is 664.89 meters (m) with a standard deviation equal to 4065.22 m, in a typical multifunctional city, respectively 352.48 m and 774.34 m).

Table 1. Arrangement and average distances between commercial and service buildings in the classification of rural areas

commune particulars (functional type)	number of buildings	percentage of commercial and service buildings	average distance from each other in meters	standard deviation of distances in meters
[1] big cities	73049	32.36	664.89	4065.22
[2] areas closely related to big cities	42344	18.76	345.79	1786.47
[3] areas of direct and indirect impact of big city	54468	24.13	318.49	716.15
[4] peripheral structures	55896	24.76	204.73	306.88

Analyzing the distribution of the centroids described in relation to residential buildings, it can be seen that the average distance between these buildings in a communal system is 714.76 m, with a standard deviation of 358.36 m. The median average distances between these buildings at a communal level is 686.92 m, one-quarter of communes have them at the level of 465.82 m, and 3/4 of them at the level below 912.60 m. The closest to the commercial facilities are residents of large cities and "banana" extending from the eastern part of the Lubuskie Voivodships and the western part of the Wielkopolska through the north-western part of Lower Silesia, southern Opolskie, the Śląskie and the western part of the Małopolskie to the northern part of the Podkarpackie. The inhabitants of the eastern part of the west and mid-western of Pomorskie are the furthest, while the communes are concentrated in the northern and eastern part of the Warmińsko-mazurskie, most of the Podlaskie, northern and eastern voivodships of Mazowieckie and eastern part of Lubelskie. The retail and service network is also far away from places of residence in the foothill areas, i.e. the band of the Sudety and Bieszczady Mountains (see Figure 1).

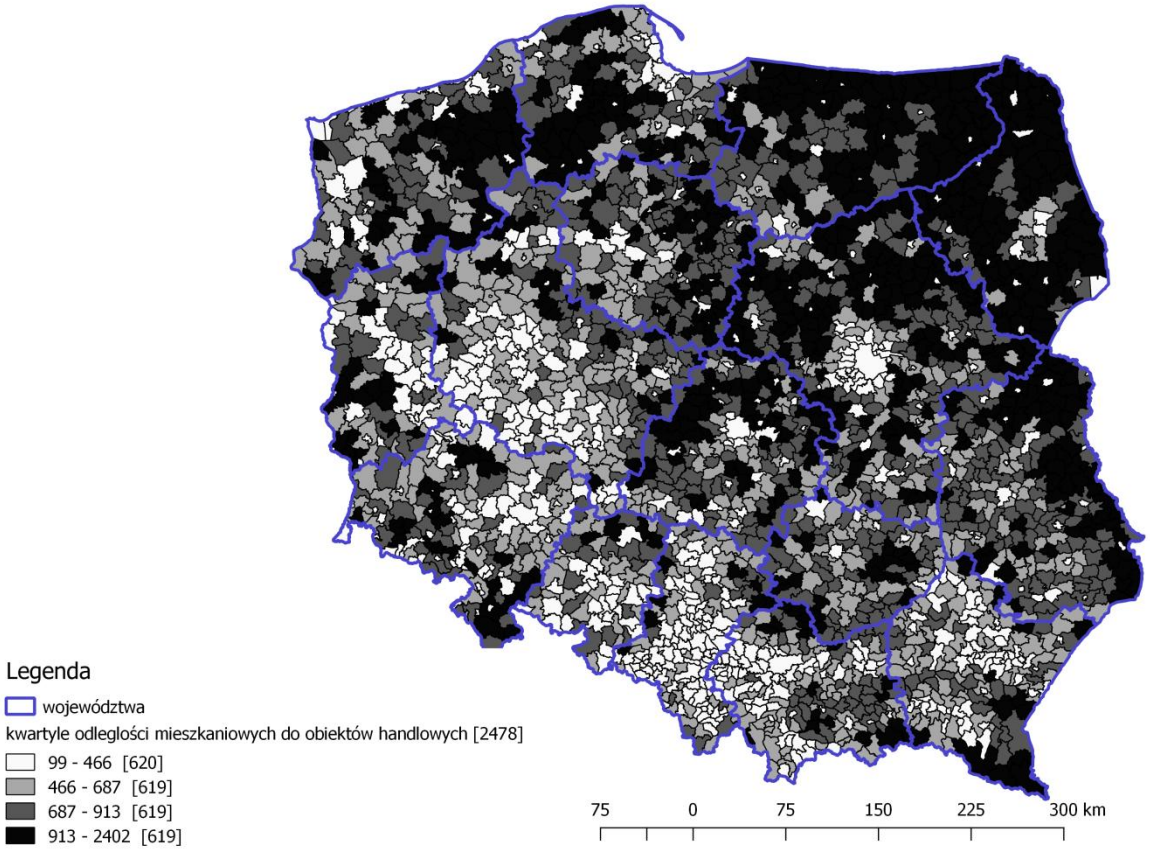

Figure 1. Quartile of distances between residential buildings and commercial and service buildings in the layout of Polish communes

Table 2. Statistical parameters of distances between residential and commercial buildings in the classification of rural areas

commune particulars (functional type)	minimal average	maximum average	mean average	average of standard deviation
[1] big cities	98.50	382.12	204.01	53.07
[2] areas closely related to big cities	104.71	1826.36	536.33	247.85
[3] areas of direct and indirect impact of big city	113.05	2064.57	617.16	374.79
[4] peripheral structures	128.99	2401.79	838.79	330.01

In general, the closer to a large city, the average distance between residential buildings and commercial and service buildings is smaller (204.01 m for large cities compared to 838.79 m for municipalities of the peripheral system). Similarly, the distribution of typical variability distributions is distributed, the limit values for large cities vary from 150.95 m to 257.08 m, while for peripheral systems they amount to 508.78 m to 1168.80 m, respectively (with the standard deviation in the direct zones and indirect impact of large cities is even greater because it is 374.79 m compared to 330.01 m for peripheral systems) (see table 2).

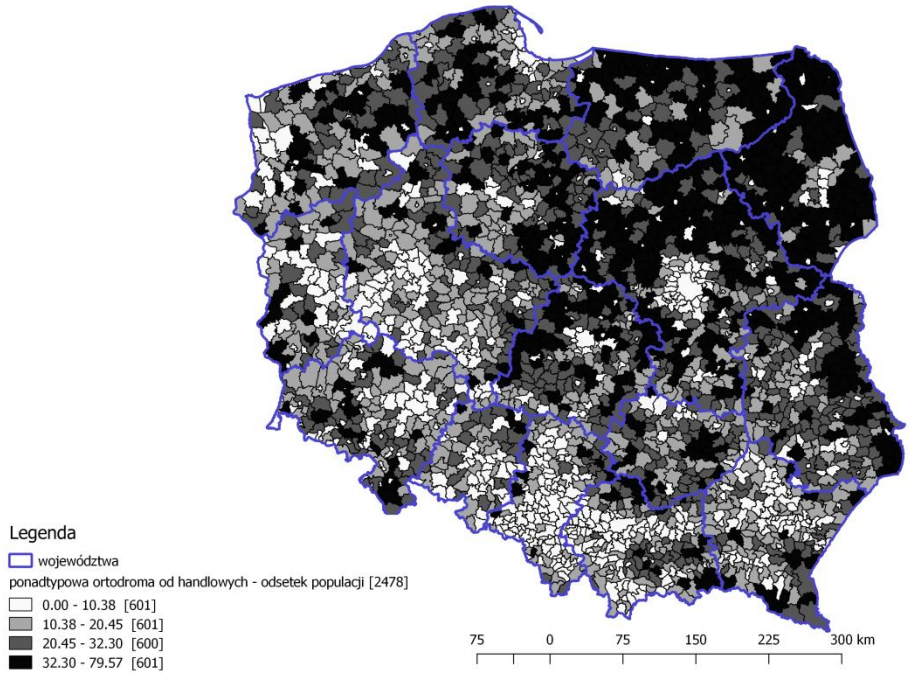

Figure 2. Quartile percentage of the population of gminas inhabiting areas of above-standard distance from commercial and service buildings

The median of areas with an extraordinary shortest distance between residential buildings and commercial and service buildings is 582 meters, while its maximum size is at the level of 9641 meters. The above-average orthodromes between the above-mentioned buildings do not occur in the area of 75 Polish municipalities. The area of occurrence of the above-typical orthodrome inhabits an average of 22.29 percent of the population in gminas with a standard deviation of 15.34 percent. A quarter of communes with over-typical shortest distances to commercial and service buildings in Poland have this index below 10.38 percent, half below 20.45, and three-fourths at the level below 32.30 percent.

Municipalities characterized by the percentage of the population inhabiting buildings with an orthodrome below 10.38 percent are located mainly in large cities and their functional areas. They are relatively numerous in the belt connecting the area of Szczecin, through the area of Gorzów Wielkopolski and south-west and the southern part of Wielkopolska, around Wrocław, Opole to the area of almost all communes of the Śląskie Voivodeship, and western and southern part of Małopolska. The end of such a defined belt takes place in the central and northern part of Podkarpackie. Similar band-like character to the percentage of population above the third quartile living in areas from the eastern and northern parts of Lublińskie, through almost the entire Podlasie to the northern part of Warmińsko-mazurskie, the second band of municipalities with such features runs from the

north-western part of Łódzkie, through the Kujawsko-Pomorskie and north - the western part of Mazowieckie to Podlaskie (merging with the previously distinguished band in this province) (see Fig. 2).

5. Conclusions

Trade is one of fundamental services shaping the quality of residents' life in a given settlement unit. Conclusions arising from reading of presented papers and scientific works allow to state that changes that had proprietary, quantitative and qualitative character have been observed in the sector in Poland over the last three decades. The number of commercial outlets, mainly domestic individual entities, foreign supermarket, hypermarket chains, shopping centres and discount stores has grown significantly. Intense competition in the form of e-trade has also occurred. Small traditional shops together with modern chain outlets create conditions for provision of services for local markets. Efficiently functioning commercial chain guarantees satisfaction of consumer needs of various groups of buyers in convenient conditions, form and time.

Conducted statistical and spatial analysis shows disparities in distribution of buildings of predominant commercial function in various areas of the country. Concentration of commercial services is observed in large and medium-size cities in Poland and in the nearest environment of big cities and agglomerations. It is closely related to direct and indirect relationships between external zone and core city economy. Approaching this phenomenon on macro-economic scale, it can be assumed that concentration of commercial chain has a linear character and is observed in south-western part of the country. On the other hand, northern and eastern part of Poland is characterised by high dispersion of commercial objects which translates into poorer accessibility of services for residents of these areas. Economic and transport conditions, as well as density of settlement network and predominant agricultural function in eastern part of the country constitute a barrier for development of new investments, including commercial investments. Economic conditions, especially incomes lower than average of the residents of voivodeships in eastern Poland are also vital in this respect (the lowest incomes per capita in 2016 and 2017 – Podlaskie, Podkarpackie and Lubelskie voivodeships)[5].

Distribution of commercial and service-providing buildings is determined by distribution of residential buildings among others. The distance between them (in the paper

[5] https://www.gfk.com/.../sila-nabywcza-mieszkancow-polski-per-capita-wyniosla-w-2017 [19.08.2018] .

described in distance approach – the shortest Euclidean path), often determines accessibility of services in a given location. The smallest distances between buildings are observed in large cities and in south-western part of the country, whereas the largest distances between places of residence and commercial and service-providing chain are reported in rural areas in north-eastern Poland and in foothill areas. Despite spatial concentration process of retail trade observed for a few years that is expressed by decline in the number of shops and growth of average selling area, proximity of an outlet to the house/flat remains the question of customer's convenience and spatial accessibility (i.e. the distance of 5 minutes on foot). Large cities and their functional areas are best in terms of commercial services and they offer most convenient buying conditions. Rural areas most often classified as peripheral areas form a scarce commercial network which results in low availability of services for customers (especially in north-eastern Poland). However, it must be noticed that the areas of poorer provision of commercial services are found in almost all municipalities, also in big and medium-size cities and their direct environment, which is proved by distribution of Euclidean supra-typical distance between residential buildings and commercial and service-providing buildings. Calculated distances when morphological structure of transport network and physiographic determinants of the area are taken into consideration are inherently longer. The scale of impact of these determinants in the whole country is not recognised yet, even though in cognitive terms it is interesting and potentially valuable (also for the entities providing described services).

Literature

Borusiak, B. (2008), Modele wzrostu przedsiębiorstw handlu detalicznego, AE, Poznań.

Ciechomski W. (2010), Koncentracja handlu w Polsce i jej implikacje dla strategii konkurowania przedsiębiorstw handlowych, Wyd. UE in Poznań, Poznań.

Ciok S., Ilnicki D. (2011), Handel detaliczny w przestrzeni dużego miasta na przykładzie Wrocławia, [in:] *Koncepcje i Problemy Badawcze Geografii,* Wyższa Szkoła Gospodarki, Bydgoszcz: pp.219-236.

Dudek-Mańkowska S., Fuhrmann M. (2009), Centra handlowe trzeciej generacji w Warszawie jako nowe produkty turystyczne, [in:] Stasiak A. (edc.), *Kultura i Turystyka– wspólnie zyskać*, WSTiH, Łódź: pp.269-271.

Dybicz T. (2001), Modelowanie ruchu generowanego przez centra usługowo-handlowe, XLVII Konferencja Naukowa Komitetu Inżynierii Lądowej i□Wodnej PAN i□Komitetu Nauki PZITB, Krynica, http://www.transeko.pl/publik/Referat_Krynica_2001.pdf, (2.10.2016).

Evans-Cowley, J.S. (2005). Regulatory strategies for big-boxes. *Zoning Practice* 22(12): 1-7.

Fularz A. (2004), Rozwój podmiejskich centrów dystrybucji detalicznej w ujęciu ekonomiki transportu, *Studia Regionalne i Lokalne*, No 4 (145/2004): 39-42.

Franke M. (2007), Lokaler Einzelhandel und Shopping-Center: *Eine Betrachtung zuden Auswirkungen eines integrierten Shopping-Centers*, Saarbrucken.

Gibas P. (2017), (ed.), *Analiza zmian i prognoza przyrostu zabudowy mieszkaniowej na obszarze Polski do 2020 roku*, Bogucki Wydawnictwo Naukowe, Poznań.

Gibas, P. & Heffner, K. (2018), Koncentracja zabudowy na obszarach wiejskich. *Wieś i Rolnictwo* No 2 (179/2018):. 189-207, DOI: 10.7366/wir022018/10.
Gorter, C., P. Nijkamp & P. Klamer (2003), The attraction force of out-of-town shopping malls: a case study on run-fun shopping in the Netherlands. *Tijdschrift voor Economische en Sociale Geografie* 94(2): 219-29.
Guy, C.M. (1998). Controlling new retail spaces: the impress of planning policies in western Europe. *Urban Studies* 35(5-6): 953-79.
Guy, C.M. (2007). *Planning for Retail Development*. New York: Routledge.
DOI : 10.1057/palgrave.rlp.5100068 (Accessed 03/09/2018).
Heffner H.**,** Twardzik M.(2013), The impact of shopping malls on the outer metropolitan zones (the example of the Silesian Voivodship), Studia Regionalia KPZK PAN, Vol. 37, Warsaw.
Herold, M., Coucleis, H., Clark, K. C., (2005). The role of spatial metrics in the analysis and modeling of urban land use change. Computers, Environment and Urban Systems 29 (4), 369-399
Hipler, H.M. (2007). Economic redevelopment of small-city downtowns: options and considerations for the practitioner. *The Florida Bar Journal* 1: 39-42.
Irwin, E.G. & J. Clark (2007). Mitigating impacts of big box retail on local communities. *Journal of Regional Analysis and Policy: Special Issue on Rural Development Policy* 37(1): 53-5.
Jones, P. & D. Hillier (2000). Changing the balance: the ins and outs of retail development. *Property Management* 18(2): 114-26.
Janiszewska A., Klima E., Rochmińska A. (2011), Jakość życia na łódzkich osiedlach, [w:] Dzieciuchowicz J. (edc..), *Współczesne przemiany środowiska mieszkaniowego – wybrane problemy*, UŁ, Łódź: pp157-162.
Kłosiewicz-Górecka U. (2006), Globalizacja w sektorze handlu w Polsce – wyzwania dla krajowych przedsiębiorstw handlowych, [in:] Mikołajczyk J. (edc.), *Handel znaczenie we współczesnej gospodarce*, WSHiU, Poznań.
Kłosowski F. (2002), Hipermarkety w przestrzeni handlowej miast aglomeracji katowickiej, [in:] Słodczyk J. (edc.), *Przemiany bazy ekonomicznej istruktury przestrzennej miast*, Uniwersytet Opolski, Opole:373-381.
Kociuba D. (2006), Nowe przestrzenie handlowe Lublina, [in:] Jażdżewska I. (edc.), *Nowe przestrzenie w miastach. Ich organizacja i funkcje*, XIX Konwersatorium Wiedzy o Mieście, UŁ, Łódź: pp.231-240.
Kucharska B., Twardzik M. (2007), Koncentracja i integracja w handlu. Aspekt teoretyczny, Wyższa Szkoła Biznesu, Dąbrowa Górnicza.
Lang, R.E. (2003). *Edgeless Cities: Exploring the Elusive Metropolis.* Washington D.C.: The Brookings Institution.
Leeuwen, E.S. (2010), The effects of future retail developments on the local economy: combining micro and macro approaches. *Papers In Regional Science* 89(4): 691-710.
DOI :10.1111/j.1435-5957.2010.00307.x (Accessed 03/09/2018).
Lösch, A. (1940). *The Economics of Location* (translated by Woglam, W.H. & W.F. Stolper, 1954). New Haven: Yale University.
Mazza, L.& Y. Rydin (1997). Urban sustainability: discourses, networks and policy tools. *Progress In Planning* 47(1): 1-74.
O'Kelly, M.E. (2009). Applied retail location models using spatial interaction tools. In: Fotheringham, S. & P.A. Rogerson (Eds.) *The Sage Handbook of Spatial Analysis*, pp. 420-43. California: Sage Publications Ltd.
Ozuduru, B.H., Varol, C. & O.Y. Ercoskun (2014). Do shopping centers abate the resilience of shopping streets? The co-existence of both shopping venues in Ankara, Turkey. *Cities* 36: 145-57.
Olszewski, D. & Gotlib D. (red.), (2013), *Rola bazy danych obiektów topograficznych w tworzeniu infrastruktury informacji przestrzennej w Polsce*. Główny Urząd Geodezji i Kartografii, Warszawa.
Parlette, V. & D. Cowen (2011). Death malls: suburban activism, local spaces, global logistics. *International Journal of Urban and Regional Research* 35(4): 794-811.
Pump-Uhlmann H., (2006), Operation Otto: Die Braunschweiger „Schloss-Arkaden'', *Angriff auf die City*, (edc.) Walter B., Junker R., Pump-Uhlmann H., Dusseldorf, Droste Sachbuch2006.
Reis, J., Silva, E., Pinho, P., (2015), Spatial Metrics to Study Urban Patterns in Growing and Shrinking Cities. Urban Geography. 37. DOI: 10.1080/02723638.2015.1096118
Sławińska M. (2008), Handel we współczesnej gospodarce. Kompendium wiedzy o handle, PWN, Warszawa: pp.14-15.
Sondej T. (2009), Handel we współczesnej gospodarce, [in:] Rosa G. (edc.), *Marketing w handlu*, Wydawnictwo Naukowe Uniwersytetu Szczecińskiego, Szczecin: pp13–28.
Szumilak J. (2004), Miejsce i rola handlu detalicznego w procesie gospodarowania, [in:] Szumilak J. (edc.), *Handel detaliczny funkcjonowanie i kierunki rozwoju*, Oficyna Ekonomiczna, Kraków: pp. 11–46.

Twardzik M. (2007), Determinanty wyboru lokalizacji centrów handlowych w województwie śląskim, [in:] Szumilak J. (edc.), *Rola handlu w tworzeniu wartości dla nabywcy*, Fundacja UE, Kraków: pp. 191–201.
Twardzik M. (2015), Lokalizacja centrów handlowych a polityka przestrzenna polskich miast, [in:] Klasik A., Kuźnik F. (edc.) *Rozwój obszarów miejskich w polityce regionów*, Studia KPZK PAN, Warszawa.
Wheeler, S.M. (2004). Planning for Sustainability: Creating Livable, Equitable and Ecological Communities. Routledge, New York.
Więcław J. (2000), Nowe centra handlowe w strukturze przestrzenno-funkcjonalnej Krakowa, [in:] Jażdżewska I. (edc.), *Miasto postsocjalistyczne. Organizacja przestrzeni miejskiej i jej przemiany*, XIII Konserwatorium Wiedzy o Mieście, Katedra Geografii Miast i Turyzmu, Łódź: pp. 175–177.
Wilk W. (2005), Miejsce miast w sieciach handlowych – przykład Polski, [in:] Lisowski A. (edc.), *Zmiany przestrzenne i funkcjonalne obszarów miejskich, Prace i Studia Geografi czne*, No. 35, Warszawa:pp. 129–153.
Wrigley, N., Shaw, H., Lowe, M., Guy, C. and Wood, S. (2007) Relocalising Food Shopping: Consumer Responses to Supply Chain Transformation in the UK Convenience Store Sector, University of Southampton.
Wrigley, N. and Lambiri, D. (2014) High Street Performance and Evolution: a brief guide to the evidence, University of Southampton, July 2014. Available at: http:// eprints.soton.ac.uk/367614/1/HighStreetBriefGuide_July2014%28final%29.pdf
Zipser W. (2006), Usługi wielkopowierzchniowe a zachowania przestrzenne mieszkańców dużych miast (na podstawie wrocławskich obserwacji), [in:] Słodczyk J., Klimek R. (edc.), *Przemiany przestrzeni miast i stref podmiejskich*, Uniwersytet Opolski, Opole: pp. 63–79.

Opis bazy danych topograficznych i ogólnogeograficznych oraz standardy techniczne tworzenia map. Załącznik do rozporządzenia Ministra Spraw Wewnętrznych i Administracji z 17 listopada 2011 r w sprawie bazy danych topograficznych oraz bazy danych ogólnogeograficznych a także standardowych opracowań kartograficznych. Tom I. Dz. U. załącznik do nru 279, poz. 1642 27 grudnia 2011 r.