

DOES COMMUTING IN POST-SOCIALIST SECOND-TIER CITIES SHOW SIGNS OF POST-SUBURBAN DEVELOPMENT? EVIDENCE FROM CRACOW¹⁾

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Zusammenfassung

Gibt es beim Pendeln in post-sozialistischen Städten der zweiten Reihe Anzeichen einer post-suburbanen Entwicklung? Befunde aus Krakau

Der Prozess der Suburbanisierung und Metropolisierung der großen polnischen Städte, der seit der Mitte der 1990er Jahre zugenommen hat, bringt spezifische soziodemographische Veränderungen mit sich. Eine der bemerkenswertesten Entwicklungen ist die Umkehrung des Migrationsstroms. Bis Anfang der 1990er Jahre war die vorherrschende

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Richtung vom Umland in die Kernstadt. Heute ist die vorherrschende Richtung der Migration der Abfluss aus dem Zentrum in die äußeren Zonen der Metropolitanregion. Diese landesweiten Prozesse sind auch in Krakau [Kraków] festzustellen. Die Wanderung der Bevölkerung ist auch von der Verlagerung von Industrie- und Dienstleistungsunternehmen begleitet, was zu einem Prozess der Post-Suburbanisierung und zur Entwicklung differenzierter funktionaler und räumlicher Beziehungen innerhalb der Metropolitanregion von Krakau führt. Ziel dieser Studie ist es, Änderungen in der Größenordnung und Richtung dieser Beziehungen innerhalb der Metropolitanregion von Krakau zu untersuchen, wobei die vom Krakauer Statistischen Amt für 2006 und 2011 gesammelten Daten verwendet werden. Außerdem haben die Autoren Daten durch Befragungen von Personen gewonnen und ausgewertet. Die Studie zeigt, dass die Krakauer Metropolitanregion neben dem vorherrschenden Prozess der Suburbanisierung variantenreiche Pendlerstrukturen aufweist, was auf eine anhaltende Post-Suburbanisierung hindeuten kann.

Schlagwörter: Krakauer Metropolitanregion, Pendeln, Metropolisierung, Suburbanisierung, Post-Suburbanisierung

Summary

The process of suburbanisation and metropolisation of major Polish cities that has been increasing since the mid-1990s involves specific socio-demographic changes. One of the most notable developments is the reverse migration flow. Until the early 1990s the predominant direction was from the surrounding countryside to the city centre. Today, the predominant direction of migration is the outflow from the centre to external zones in the metropolitan area. Similar processes as nationwide are observed in Cracow [Kraków]. The people's migration is accompanied by the relocation of industrial and service companies, which leads to the process of post-suburbanisation resulting in the development of differentiated functional and spatial relationships within the Cracow Metropolitan Area (CMA). The purpose of this study is to examine changes in the scale and direction of these relationships within the CMA using data on commuting collected by the Cracow Statistical Office for 2006 and 2011 as well as survey data collected and analysed by the authors. The study demonstrates that besides the prevailing process of suburbanisation the Cracow Metropolitan Area shows diversified patterns of commuting, which may indicate ongoing post-suburbanisation.

Keywords: Cracow Metropolitan Area, commuting, metropolisation, suburbanisation, post-suburbanisation

1 Introduction

Suburbanisation, defined as decentralisation of urban population, capital and human activities, is one of the main processes of post-Socialist urban development changing the

nature of metropolitan regions and shaping socio-spatial segregation at the city-suburban scale (KÄHRİK & TAMMARU 2008; LEETMAA & TAMMARU 2007; OUŘEDNÍČEK 2007; STANILOV 2007; TIMÁR & VÁRADI 2001; LEETMAA et al. 2009). Residential suburbanisation has by now been recorded in many cities in transformation countries of East-Central, East and South-East Europe (e.g., HIRT 2007, 2013 on Sofia [Sofija]; NUISSL & RINK 2005 on Leipzig; BUZAR et al. 2007 on Ljubljana; RUDOLPH & BRADE 2005 on Moscow [Moskva]; NOVÁK & SÝKORA 2007; STANILOV & SÝKORA 2012; SÝKORA 1999a; 1999b on Prague [Praha]; DINGSDALE 1999; KOK & KOVÁCS 1999 on Budapest; RUOPPILA 1998; and LEETMAA et al. 2009 on Tallinn).

Although the main drivers of suburbanisation in these transformation countries (i.e., migration from the core city to the hinterland) are similar to Western countries (TIMÁR & VÁRADI 2001), the process in the post-Socialist area is accompanied by specific features of socio-economic transition including shift of power and responsibility from central to local governments, changes in the labour market and social stratification order, privatisation of the housing stock and land as well as the availability and cost of mortgages (LADÁNYI & SZELÉNYI 1998; LEETMAA & TAMMARU 2007; OUŘEDNÍČEK 2007; KOK & KOVÁCS 1999). The need to improve housing conditions, especially the desire to live in a house of one's own is one of the most important factors in the decision to move to a new suburban settlement among post-Socialist city residents (KÄHRİK et al. 2012).

In addition, suburbanisation in Western European societies had been taking place much more gradually embracing the second half of the 20th century having had more time to respond to its negative consequences by formulating an appropriate policy while the course of the process in former Communist Europe was much more rapid and uncontrolled (STANILOV 2007). Suburbanisation virtually did not exist in the Socialist state, which gave priority to the construction of prefabricated multi-family blocks of flats with the basic services such as schools and hospitals (HIRT 2013). The only exceptions were secondary homes (*dacha*) in the outskirts of larger cities and so-called stepping-stone suburbanisation or rural urbanisation including migration of residents from the countryside or second-tier cities in order to find better employment opportunities and wait for chances to move permanently to the city (TOSICS 2005; IOFFE & NEFEDOVA 1999; HIRT 2013; KOK & KOVÁCS 1999).

Studies concerned with post-Socialist suburbanisation most often pay attention to the impact of the process on changes in the social structure of new suburbanites concluding a decrease in population polarisation between the core city and the hinterland and a simultaneous increase in segregation within the suburban rings (HIRT 2007; KOK & KOVÁCS 1999; LADÁNYI & SZELÉNYI 1998; LEETMAA & TAMMARU 2007; RUOPPILA & KÄHRİK 2003; SEDLÁKOVÁ 2005; SOÓS & IGNITS 2005; TAMMARU 2001, 2005; TAMMARU & LEETMAA 2007; TIMÁR & VÁRADI 2001). However, ŠPAČKOVÁ & OUŘEDNÍČEK (2012) found that there are no major conflicts between the indigenous inhabitants and the new suburbanites. The result of suburbanisation is the change of demographic composition and natural population growth (OUŘEDNÍČEK 2003; VOBECKÁ & PIGUET 2012; KUREK et al. 2015). New suburbanites are younger and better educated than old residents in the suburbs with over-representation of families with young children, which may contribute to higher natural increase and the rise of total fertility rate (OUŘEDNÍČEK 2007; VOBECKÁ & KOSTELECKY 2007; KÄHRİK & TAMMA-

RU 2008; KUREK, GAŁKA & WÓJTOWICZ 2014). Thus, socio-demographic composition of the inhabitants has become much more diverse in accordance with the diffusion of the second demographic transition (VAN DE KAA 1987) including singles and single parents (HELBICH & LEITNER 2009).

Recent studies showed that modern transformations of urban regions in Western Europe lead to the development of functionally almost independent suburban settlements. Their origin is related to the transfer of services and industry to the suburban area. The movement of retailing from business districts to the fringes, the development of shopping malls in the outskirts as well as the shift of corporate offices and research facilities to open spaces of suburbia was pronounced in the United States of America (USA) in the 1950s and 1960s. The development of suburban shopping malls and outward movement of office spaces was evident in Europe in the 1960s and 1970s (TEAFORD 2011).

Changing the role of the suburban zone is referred to in the literature as post-suburbanisation processes, which consist in weakening the functional-spatial relations between the suburban zone and the core, which is expressed by the change of directions of commuting (BORSORF 2011). Post-suburbanisation is distinguished among others by agglomeration of offices and retail spaces in urban fringes leading to suburban employment increase as well as suburban out-commuting reduction (PHELPS & WU 2011). Post-suburbia is then a settlement space “in which nothing is by necessity tied to the historic urban core but virtually all functions and activities are footloose and free to migrate to the open spaces of the periphery” (TEAFORD 2011, p. 16).

Post-suburban landscapes are characterised by reorientation of the spatial structure into independent from core cities' settlement areas along with social diversification of population (HELBICH & LEITNER 2009). The emergence of post-suburbia is associated with re-organisation of former residential suburbs into polycentric and functionally differentiated independent urban spaces, which are no longer dominated by any central cities (BONTJE & BURDACK 2011). Most often post-suburbs can be identified by the diversification and extension of their economic base, including the emergence of spatial clusters of employment and by changing patterns of commuting with gaining importance of commuters from the core city to the fringes as well within the suburbs (CERVERO 1989; GARREAU 1991; KLING et al. 1995; ARRING 1999; PHELPS et al. 2006).

Since the mid-1990s, the most important change in the redistribution of the population in Poland has been its progressive concentration in metropolitan areas and relocations within those areas, mainly from central cities to suburban areas alongside the depopulation of peripheral areas (WEĆLAWOWICZ et al. 2006). Recent years have seen an intensive development of the areas surrounding large and even medium-sized cities as a result of two processes: (a) suburbanisation processes, which are characterised by spontaneous influxes of population and the development of housing; (b) post-suburbanisation processes, which are characterised by the relocation of industry and services from the city core to suburban areas and accompanying increases in infrastructural development (KUREK, GAŁKA & WÓJTOWICZ 2014). Areas located in the zone of influence of the major cities are rapidly losing their rural character as parcels of agricultural land are transformed into building plots, new individual houses or semi-detached and terraced houses are constructed and new services and industry companies are opened (JAKÓBCZYK-GRYSZKIEWICZ et al. 2010; ZBOROWSKI et al.

2011; KAJDANEK 2011, 2012). The development of post-suburbanisation processes also in Poland promotes the formation of new commuting directions and configurations (KUREK, RACHWAŁ & WÓJTOWICZ 2014).

The development of public transport in the suburban areas and commuting to the work of Polish metropolitan areas has been very uneven since the beginning of the political and economic changes in 1989. Initially, it was characterised by stagnation and even recession, manifesting itself in limited frequency and in many cases even by closing suburban bus lines (KOŁOŚ & TACZANOWSKI 2018). Particularly clear was the regression of railway transport in metropolitan areas, which coincided with a very serious crisis of this means of communication in the whole country (TAYLOR & CIECHAŃSKI 2006). The decline in importance of public transport was also due to the lack of cooperation between the central city and neighbouring municipalities (WIECŁAW-MICHNIEWSKA 2010). Only the turn of the 20th and 21st centuries brought a renewed increase in the number of connections and the emergence of new lines, initially only bus. The next stage is the creation of agglomeration railways, but we are currently observing only the beginnings of this process (KOŁOŚ & TACZANOWSKI 2018). Private operators are attempting to fill that gap, but their network of connections is relatively poor and fails to provide sufficient connections, especially on weekends and holidays (MICEK 2010). Therefore, for today's inhabitants of towns and suburbs, the car has become the only means of transport to meet the challenges of the fast-paced modern urban life (KOMORNICKI 2011).

The population migrating to suburban areas takes the urban lifestyle and modern family model to those areas, while generally not losing connections to the city centre by commuting to work and the use of various services (GUTIÉRREZ & GARCÍA-PALOMARES 2007; KAJDANEK 2011; LYONS & CHATTERJEE 2008). Studies of the time-space activities of Prague's suburban population demonstrated strong ties of the working and learning population to the city centre on weekdays and an increased mobility within the suburbs on weekends (NOVÁK & SYKORA 2007).

The aim of this study is to examine changes in the scale and direction of functional and spatial relationships within the Cracow [Kraków] Metropolitan Area (CMA) in Poland from 2006 to 2011 using commuting data collected by the Central Statistical Office and own surveys. Addressing this requires taking a closer look at two issues:

- What are the scale and main directions of commuting and how have they changed recently due to centralisation and decentralisation processes?
- What is the relationship between social and demographic characteristics of commuters and volumes and directions of commuting (to Cracow or to another city) as well as average distance of commuting?
- Are post-suburbanisation processes currently observed in the CMA and how are they affecting the directions of commuting?

In our contribution to literature on urban studies we would like to add a post-Socialist perspective to the debate on 'post-suburbia' and illustrate it with examples from second-tier cities in Poland – formerly mainly industrial while service-sector dominated urban centres today. We also contribute to the ongoing literature on commuting in metropolitan areas using an example of a post-Socialist city that is not a country's capital, but

one that was formerly dominated by heavy industry (steelworks) and now is undergoing progressive suburbanisation processes along with the relocation of industry and services.

Former Communist Europe has become a mass-emigration region since the socio-economic transition to free market economy in the early 1990s, enhanced by joining European Union (EU) in 2004 of some East-Central European countries. The exceptions to this are the national capitals and their surroundings, where the core cities and the suburbs are generally growing fast (BONTJE & BURDACK 2011, p. 145). What is the situation then in non-capital cities of post-Socialist states? Cracow is one of the fastest growing centres of business services in Poland today (including outsourcing investment), thus the labour market continues to grow (NOWORÓL 2014).

The paper is organised as follows: In the first part, intensity and directions of commuting in the Cracow Metropolitan Area are presented based on Central Statistical Office data. In the subsequent part, social and demographic characteristics of commuters based on a survey is used, followed by statistical analysis of significance of the relationship between the mobility of the population and selected socio-demographic variables. In the final part, the results are discussed, and the final conclusions are drawn.

Previous studies have shown that since the fall of Communism suburbanisation has been the main process influencing the change of the spatial structure of cities and the mobility of inhabitants in national capitals of transformation countries (e.g., LEETMAA & TAMMARU 2007; KÄHRİK & TAMMARU 2008; OUŘEDNÍČEK 2007; STANILOV 2007). Previously, in Socialist countries commuting to work was generated by intensive industrialisation processes, which were taking place faster than the development of housing estates (SZELENYI 1996; TAMMARU 2005).

2 Study area

The research area is the Cracow Metropolitan Area (CMA) in Poland, because in contrast to well-studied suburbanisation mechanisms in the capital cities of post-Socialist Europe, the other large cities are less often analysed, although they may provide interesting examples based on their specificity. In the case of Cracow, a city with a long history (former capital of Poland) and strongly industrialised in the times of Socialism, contemporary processes refer to these two legacies. At present Cracow is the second-largest city of the country (761,863 inhabitants in 2014) with an annual average growth of 0.18% in the last five years. Prior to the late 1980s, steelworks played an important role in the employment structure (maximum employment reached 38,600 workers at the end of 1970s). However, today it is primarily a centre of services (including service centres for business and management), a significant centre of higher education and an important scientific and cultural centre with a well-developed tourism sector (Old City Centre, Kazimierz Jewish District; Wieliczka salt mine and Auschwitz Museum nearby). According to the report of the Association of Business Service Leaders (ABSL) in Poland, Cracow is the definitive leader in terms of employment in the sector of modern business services in Poland. More than 50,000 people work in service centres in Cracow being the most important business ser-

vice centre in East-Central Europe (GÓRECKI et al. 2016). The development of the business service sector was associated with the potential of universities and research and development institutions. Growth in the number of higher education institutions in 1990s attracted many students to Cracow leading to the studentification of urban space (MURZYŃ-KUPISZ & SZMYTKOWSKA 2015). Substitution of jobs in the industrial sector by jobs in the rapidly growing service sector as well as social and economic changes in the transition period leading to progressive suburbanisation could and would very likely alter the intensity and directions of commuting as well as the profile of commuters.



Source: Own study based on Plan zagospodarowania przestrzennego województwa małopolskiego, 2003

Fig. 1: Spatial extent of the Cracow Metropolitan Area (CMA)

The Cracow Metropolitan Area is a functional region, which includes Cracow city and 50 municipalities including one urban municipality, 14 urban-rural municipalities and 35 rural municipalities. The research area was divided into three zones: the core city – Cracow, the suburban area – 12 municipalities directly adjacent to the city (the first ring), and the commuting zone – 38 municipalities located further away from the city, with an average commuting distance of 50 km (the second ring). With reference to the classification into urban and rural units and Cracow itself, the CMA has 65 spatial units, which were included in this analysis (Fig. 1).

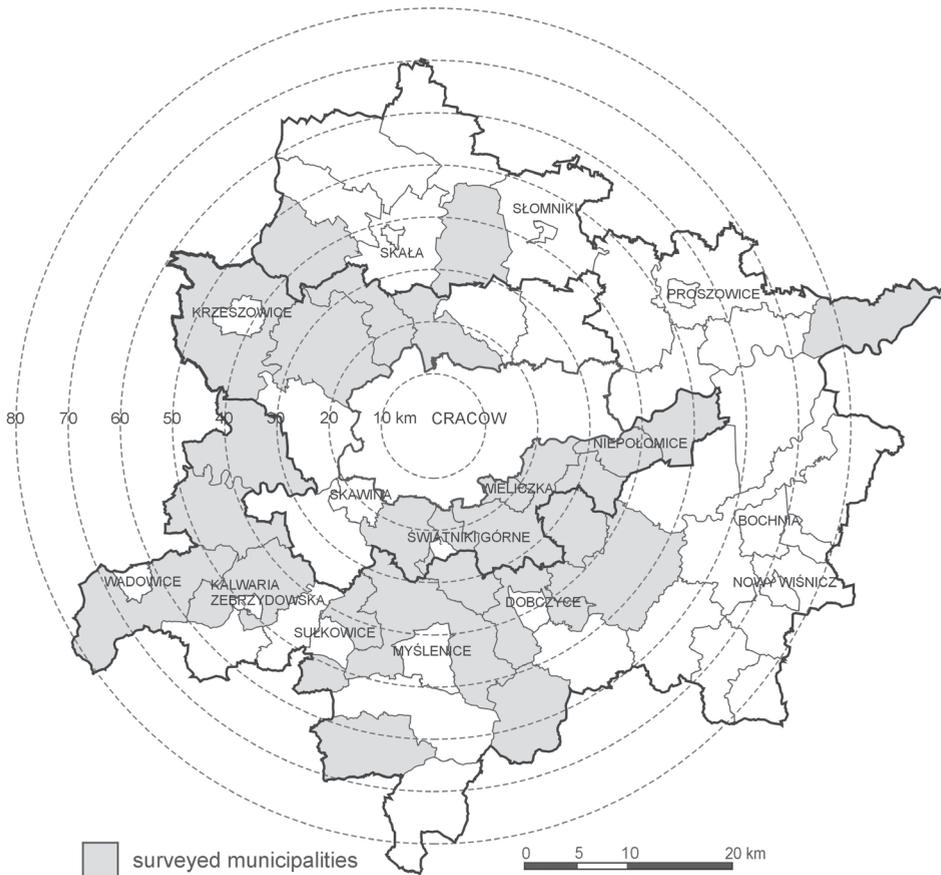
In 2014, the CMA region within these borders had a population of 1,488,000 people, of which 762,000 or 51% of the population of the entire metropolitan region reside in Cracow. It should be noted that Cracow's share in the population of the CMA is gradually decreasing, in part the result of recent suburbanisation. In 1988 it was 54.2% (KUREK, GAŁKA & WÓJTOWICZ 2014). Suburbanisation processes have also affected the dynamics of employment: From 1995 to 2014 the number of people working in Cracow increased by 29% according to Cracow Statistical Office data, whereas in the suburban area (in the first ring) this increase was 90% and in the commuting area (in the second ring) by 33%.

3 Methodology

One of the most important indicators determining the strength and direction of functional relationships within the metropolitan area is the volume and direction of commuting to work. The indicator also allows us to determine the range of spatial interactions of and with the central city and its ability to attract its labour force as well as to show the degree of post-suburban transformation (ZBOROWSKI 2004, 2005; ŚLESZYŃSKI 2013a, 2013b).

The only comprehensive statistical data referring to the contemporary commuting to work in Poland were published by the Cracow Statistical Office for 2006 and 2011. They are the only available materials for comparative studies, which were used to determine and measure the contemporary scale of the phenomenon (see ŚLESZYŃSKI 2012; GUS 2014). The official data shows the volume and direction of commuting between municipalities; however, it leaves out the socio-demographic features of the commuting population, and our own survey is hoping to fill in those gaps. Therefore, to examine the impact of socio-demographic characteristics on volume and direction of commuters, the survey was carried out. It studied the directions of commuting depending on the distance from the central city, the origin of inhabitants (in-migrants from Cracow or another city and permanent residents – autochthones), their age structure, income level and education as well the type of commuting used (public transport or private car). The survey was carried out from August 2013 to June 2014 of residents of the Cracow Metropolitan Area living in the 23 municipalities of the first (municipalities adjacent to Cracow) and the second rings (municipalities with average distance of 50 km from the centre of Cracow) (Fig. 2). The questionnaires were collected separately for the in-migrants and permanent residents. The survey was carried out on a purposive sampling based on their location in the suburban and commuting zone of the Cracow Metropolitan Area. A total of 1,521 respondents

were interviewed, among them 59.8% women, and 79.9% of population at 18-44 years of age. The vast majority of respondents was married at the time of the survey (almost 75%), and the second-largest number were the singles – 17.5%. People with higher education constituted 38% of total respondents while persons with upper secondary education – 31%. In addition, 54.2% of the respondents were permanent residents. The percentage of questionnaires collected in the first and second ring was similar and amounted to 45.8% and 54.2%, respectively. We used the SPSS computer programme to analyse the data.



Source: Own study

Fig. 2: Surveyed municipalities in the CMA

The activity of commuting to work was considered to be a kind of displacement resulting from making formal or informal employment or another contract of employment between the villages/towns (i.e. the village/town of residence and the village/town of work). Displacements in the same unit were not treated as commuting.

4 Results

4.1 Changes in size and spatial structure of commuting in CMA

Previous research on the intensity of commuting to Cracow (ZBOROWSKI 2005) showed relatively small changes in functional and spatial relationships on the labour market. From 1988 to 1996 the commuting population decreased from 67,000 to 62,000 (ZBOROWSKI 2005, p. 132). But this decrease affected mainly those suburban municipalities, in which, due to industrial suburbanisation processes, new jobs were created. It should also be noted that de-industrialisation and the large decrease of employment in industry in Cracow (e.g., from 1988 to 2014, especially employment in the ArcelorMittal steelworks, which declined from approximately 30,000 to less than 3,000 (SOJA 1989; ARCELORMITTAL 2014), did not cause a reduction in the intensity of commuting to work, because it was followed by a rapid increase of jobs in the services sector.

Cracow is a central city that also has the largest labour market in the Lesser Poland Voivodeship [województwo małopolskie]. Thus, it is not surprising that it attracts not only the population of the surrounding towns, but also people from other regions of Poland and foreigners as well (from Italy, Spain, India, Ukraine etc.) (GAŁKA 2017; GÓRECKI et al. 2016). More than 37% of the total population commuting to Cracow lives in a distance of over an hour drive (DOMAŃSKI & NOWORÓL 2010). There are also other cities and towns in the CMA offering employment opportunities to counterbalance Cracow, especially those located on the outskirts of the area, such as Kalwaria Zebrzydowska and Wadowice. Data reported by the Central Statistical Office show that Cracow is still the most important employment centre in terms of commuting in the Lesser Poland Voivodeship. In 2006, ca. 58,400 people commuted to work to Cracow, while in 2011 this number increased to 91,300.

However, the observed increase in commuting to Cracow, amounting to 56.4%, was much slower than the dynamic increase in commuting to areas outside the city, which increased by three and half times in the study period (Table 1). On the one hand, the changes could be the result of the ongoing process of suburbanisation of industry and services, since the number of people commuting from Cracow to suburban municipalities and the commuting zone doubled, respectively, from 4,350 to 8,700 people and from 1,100 to 2,200 people. On the other hand, the largest increase was recorded in those commuting to work outside the CMA area, which increased more than 7-fold, from 2,400 to 17,300 people (Fig. 3). Given that this number commutes mainly to other large urban centres, this growth indicates how rapidly the processes of metropolisation are occurring and also the growing importance of functional relationships between Cracow and other large urban centres in Poland. This was especially visible in the case of commuting from Cracow to Warsaw [Warszawa], which increased from 800 to over 7,500 persons between 2006 and 2011 (GUS 2014). In this context, the increase in the number of people commuting from Cracow to work in external zones of the CMA is not so spectacular, though in 2011, it amounted to a total of 10,900 people, which represent 38.6% of the total number of commuters from Cracow (Fig. 3). It should also be noted that, in contrast to other areas of the CMA, Cracow has a high positive balance in numbers of commuters, which recorded nearly 25% increase in 2011 (Table 1).

Municipalities	Commuters from Cracow		Change 2006=100
	2006	2011	
Wieliczka	634	1139	179.7
Skawina	964	1543	160.1
Zabierzów	1266	2442	192.9
Liszki	169	291	172.2
Niepołomice	543	1287	237.0
Bochnia (city)	97	197	203.1
Krzyszowice	126	173	137.3
Zielonki	250	765	306.0
Myślenice	215	340	158.1
Czernichów	57	85	149.1
Wielka Wieś	118	425	360.2
Gdów	64	113	176.6
Kocmyrzów-Luborzyca	78	119	152.6
Mogilany	127	254	200.0

Source: Own elaboration based on HUCULAŁAK et al. 2013, p. 145, and GUS 2014

Tab. 1: Commuting from Cracow to selected municipalities in the CMA in 2006 and 2011 (in persons)

The situation in the CMA suburban area is different. There, the balance of the daily professional mobility of the population is negative and this trend is getting stronger. In the study period, the negative balance of commuting increased by nearly 8%. It is also noteworthy that the negative balance of commuting in the second ring grew by nearly 41% at the same time. This change indicates that the inhabitants of this zone commute to municipalities beyond it to a much larger extent. At the same time, the so called ‘internal’ commuting increased by 16.6% in the commuting area. ‘Internal’ commuting defines commuting between the municipalities located within the zone. For comparison purposes the increase in this type of commuting in the suburban area was much larger: It exceeded 46%, but the total volume of commuters in absolute terms was significantly lower than in the second ring (Table 2).

In both external zones of the CMA, the main direction of commuting outside the zones is to Cracow (Fig. 3). However, in the suburban area, the share of commuting within the zone has grown, which together with the decrease in commuting to Cracow may indicate a gradual economic suburbanisation manifested in many new investments by industrial and service companies in this area and points to the beginning of the post-suburbanisation process that is emerging in the growing importance of suburban areas in generating jobs and weakening links with the central city (KUREK, RACHWAŁ & WÓJTOWICZ 2014).

Specification	2006	2011	Change 2006 = 100
Cracow core city			
Commuters to Cracow	58.4	91.3	156.4
Commuters from Cracow	7.87	28.24	358.9
Balance	50.54	63.1	124.8
The quotient	7.42	3.23	-
Suburban area (first ring)			
Commuters to the area*	9.35	14.64	156.6
Commuters from the area*	21.75	28.0	128.8
Balance	-12.4	-13.4	107.8
The quotient	0.43	0.52	-
Commuters to Cracow	19.2	24.3	126.6
Commuters from Cracow	4.35	8.7	200.0
Commuters within the zone	5.85	8.56	146.2
Commuting zone (second ring)			
Commuters to the area*	6.7	8.8	131.2
Commuters from the area*	23.6	32.56	138.1
Balance	-16.9	-23.8	140.8
The quotient	0.28	0.27	-
Commuters within the zone	15.74	18.35	116.6
Commuters to Cracow	17.1	22.6	132.2
Commuters from Cracow	1.1	2.2	200.0

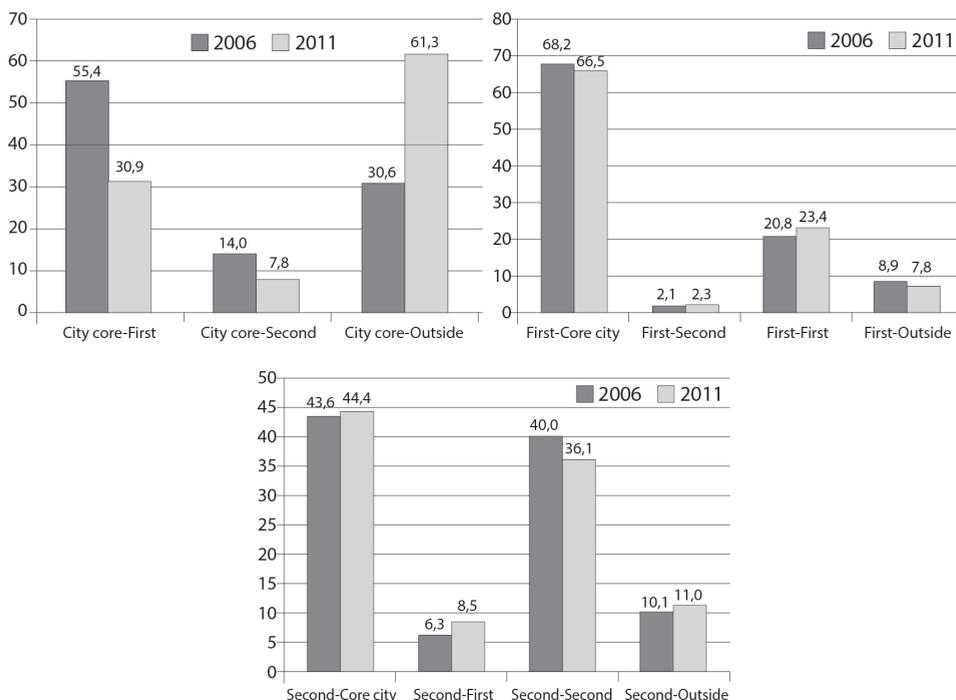
* Commuting from and to the area includes municipalities located outside the zone.

Source: Own study based on data from the Central Statistical Office

Tab. 2: Commuting to individual zones of CMA in 2006 and 2011 (in thousand persons)

This development redirected much of the commuting to other fast-growing labour markets in this area located outside the core city, that is, to the municipalities of Zabierzów, Niepołomice, Wieliczka or Skawina. It was connected with the functioning of Economic Activity Zones and Technology Parks, which attracted investors with foreign capital (including Coca-Cola, MAN automotive industry and DHL Parcel Delivery Service) as well as relocation of some industrial plants to the fringes, e.g., Wawel confectionary producer, Vistula men'swear producer and Tele-Fonika Kable Group cables and wires provider (HUCULAK 2011; HUCULAK et al. 2013; KUREK, RACHWAŁ & WÓJTOWICZ 2014). In the case of people commuting to work from Cracow to other areas (without taking into account local

commuting), the share of commuting outside the CMA in the period 2006–2011 has also significantly increased (from 30.6% to 61.3%). This change can be attributed to metropolisation and the increasingly strong links between other large urban centres in the area of employment (mostly managers).



Source: Own study based on data from the Central Statistical Office

Fig. 3: Commuting from: A – the central city, B – the first ring (suburban area), C – the second ring (commuting zone) in 2006 and 2011 (in %)

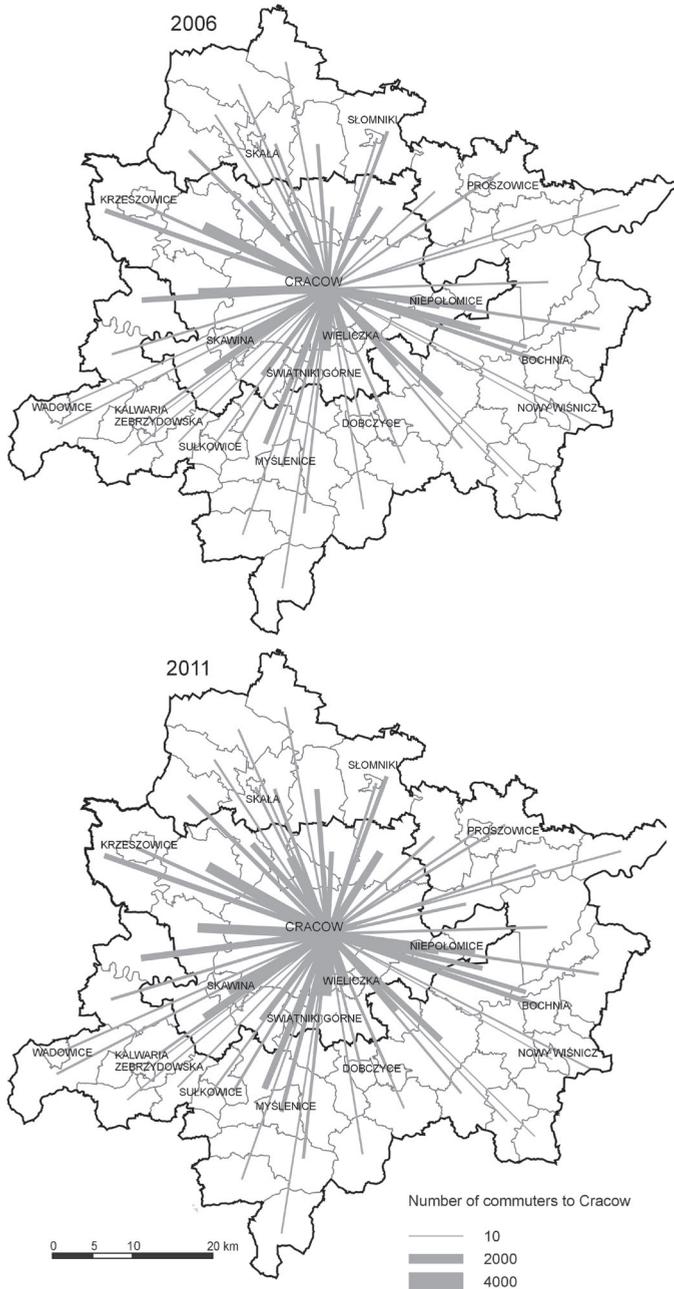
An analysis of the index reflecting the relationship between commuters in total and the number of people employed in a given municipality (regardless of their place of residence) showed that the lowest values are found in cities with a relatively well-developed labour market and in some municipalities where progressive industrial and services suburbanisation and also post-suburbanisation processes could be observed. The best examples are the nearby municipalities of Zabierzów, Zielonka and Wielka Wieś surrounding Cracow in the North-West (see Fig. 1). In this area, there are a large office centre – the Cracow Business Park –, newly established shopping and storage centres and new industrial investments (Fig. 4).

Suburbanisation and post-suburbanisation service and industrial processes are not yet developed enough to cause a change in the prevailing direction of commuting – Cracow remains the main commuter area for the CMA –, however, the observed trends suggest that

other directions of commuting (e.g., from Cracow to the first ring) have gained their importance. In general, the extent of commuting to Cracow has increased in most municipalities in the studied period (Fig. 4). In six municipalities surrounding Cracow, more than 90% of the total working population living in those municipalities commute to Cracow (DOMAŃSKI & NOWORÓL 2010). Progressive suburbanisation processes result in the expansion of housing and, to a lesser extent, in the creation of a significant number of new jobs. The biggest stream of commuters to Cracow in both periods came from the rural part of the municipality of Wieliczka. It is located in the immediate vicinity of the city and in recent years was experiencing rapid developments in housing following rapid residential suburbanisation (ZBOROWSKI et al. 2011; WÓJTOWICZ et al. 2014).

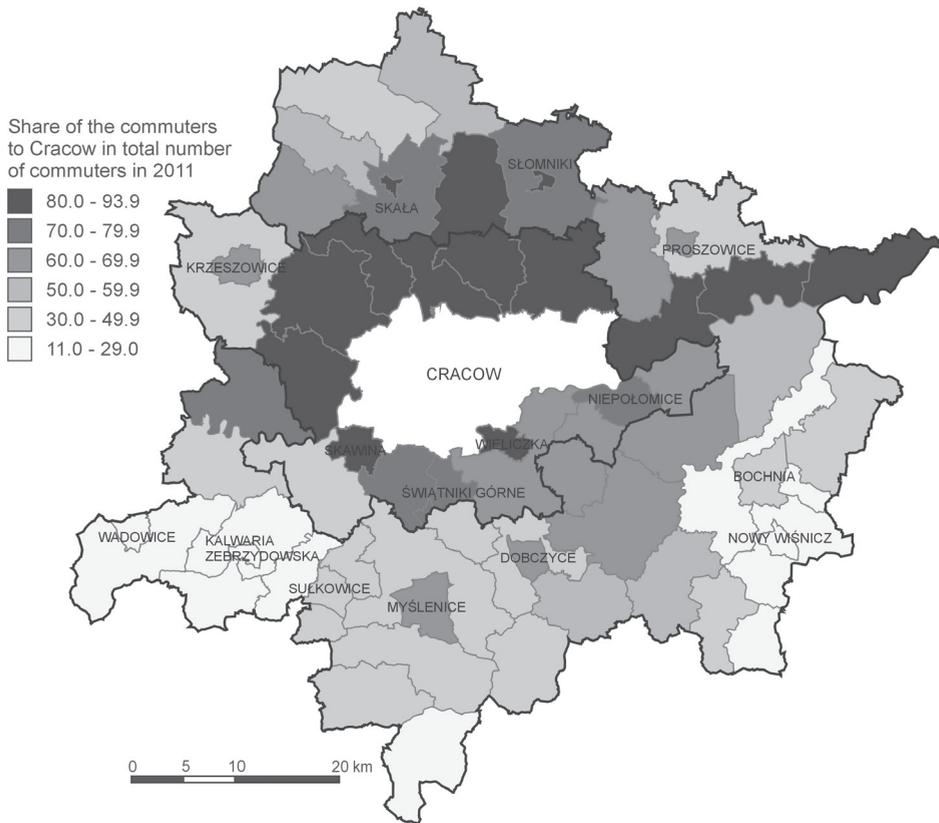
The second municipality in terms of the volume of commuters to Cracow in 2006 was Zabierzów, which is adjacent to Cracow in a northwest direction. Here, too, the number of people commuting to Cracow in the study period increased from over 1,900 to nearly 2,200 people. However, what it is even more interesting is a much more dynamic change in the number of people commuting from Cracow to Zabierzów (Table 1). This high increase resulted in a situation, unprecedented in the other CMA units. In 2011, Zabierzów recorded a positive balance of commuting from Cracow. Zabierzów now belongs to those municipalities experiencing very fast residential suburbanisation, but also a rapid suburbanisation of industry and services, which is due to its good accessibility and being at the crossroads of the Cracow ringroad and the A4 motorway connecting Cracow with Upper Silesia [Górny Śląsk]. A particularly important factor in attracting commuters from Cracow is the Cracow Business Park located in Zabierzów, which has nearly 6,000 employees in its business services, and also the airport in Balice is nearby (TRZEPACZ & WIĘCŁAW-MICHNIEWSKA 2007; KORNET 2011; KUREK, RACHWAŁ & WÓJTOWICZ 2014). The increase in commuting from Cracow can also be observed in other CMA municipalities, e.g., in Wieliczka, Niepołomice and Wielka Wieś (Table 1). This demonstrates the development of the post-suburbanisation process, manifesting itself in the growing importance of suburban areas in job creation and thus weakening relations with the central city (PHELPS et al. 2006; BORSODORF 2011).

The importance of Cracow as a destination labour market is shown in municipalities along the main roads. This observation is indicated by the increasing volume of commuting to Cracow from municipalities located to the Northeast, North, South-East or South from the city (Fig. 5). However, the share of commuting to Cracow is relatively low in the municipalities surrounding major towns in the commuting zone located to the South such as Bochnia, Myślenice and Wadowice. These towns are in fact local labour markets and the destination for commuters from neighbouring rural areas and neighbouring municipalities. They are also undergoing processes of suburbanisation, comprising the part of the population migrating to rural areas in the surveyed municipalities or to neighbouring units that result in increases in the already large worker migration flows (KUREK, GAŁKA & WÓJTOWICZ 2014). This fact is particularly evident in towns that are actively developing their industry and services by creating Zones of Economic Activity in their territories (e.g., Myślenice, Dobczyce, Wieliczka, Skawina, Niepołomice), which attract new investment and increase their employment (KUREK, RACHWAŁ & WÓJTOWICZ 2014). Similar processes



Source: Own study based on data from the Central Statistical Office

Fig. 4: Commuting to Cracow from municipalities of the CMA in 2006 and 2011

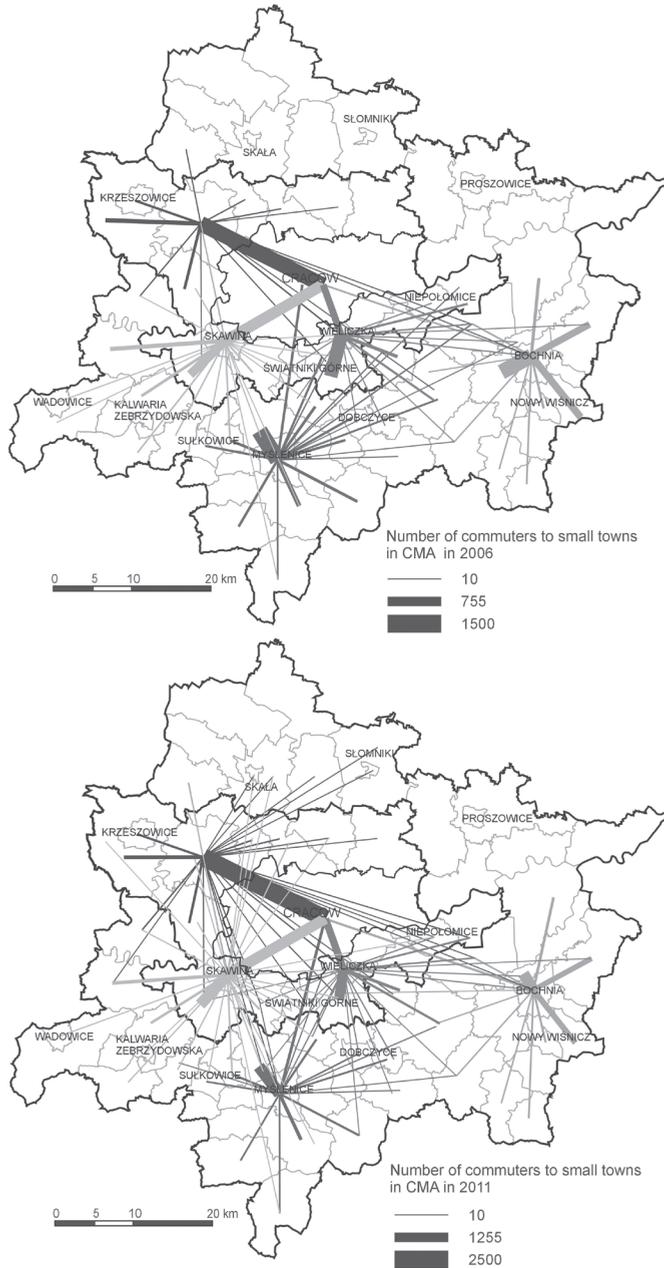


Source: Own study based on data from the Central Statistical Office

Fig. 5: The importance of Cracow in the total volume of commuting from municipalities of the CMA in 2011

of suburbanisation occur in other small towns in Lower Silesia [Dolny Śląsk], which also have resulted in increases in commuting (KAJDANEK 2012).

It is worth noting that in small towns of the second ring, the commuting covered mainly rural parts of the municipality and the immediate neighbourhood. For towns of the second ring, Cracow plays a very important and often dominant role as the source of commuters (Fig. 6). This also indicates the process of decentralisation of employment, which in time could decrease the importance of commuting to the central city, while new commuting directions will be established within the metropolitan area. Similar spatial and temporal processes as to the CMA are already observed in metropolitan areas of Spain and France, where suburbanisation and changes in functional and spatial relationships began much earlier than in Poland (GUTIÉRREZ & GARCÍA-PALOMARES 2007; AGUILERA et al. 2009; GARCÍA-PALOMARES 2010).



Source: Own study based on data from the Central Statistical Office

Fig. 6: The volume of commuting to selected towns of the CMA and to Zabierzów in 2006 and 2011

4.2 Commuting in the light of the survey

The results of the survey revealed that more than half of the respondents were commuters (Table 3). Women were less mobile than men. The reasons for the lower mobility of women in terms of commuting has many likely causes. One is the smaller percentage of women having professional careers, especially in rural areas far from a big city. The lower mobility of women may also be due to the fact that they do not use cars as much as men and thus are more dependent on public transportation (CEBOLLADA 2009).

Variable		commuting	not commuting
Gender	Female	50.4%	49.6%
	Male	65.2%	34.8%
	total	56.3%	43.7%
Economic age groups	18–44	64.5%	35.5%
	18–24	38.4%	61.6%
	25–34	71.4%	28.6%
	35–44	68.4%	31.6%
	45–59/64	56.5%	43.5%
	60/65+	15.6%	84.4%
	total	56.3%	43.7%
Economic age groups and area of residence	second ring		
	18–44	69.9%	30.1%
	18–24	44.3%	55.7%
	25–34	74.3%	25.7%
	35–44	78.1%	21.9%
	45–59/64	62.7%	37.3%
	60/65+	18.4%	81.6%
	total	61.4%	38.6%
	third ring		
	18–44	59.9%	40.1%
	18–24	31.9%	68.1%
	25–34	68.7%	31.3%
	35–44	61.8%	38.2%
	45–59/64	51.6%	48.4%
	60/65+	12.9%	87.1%
	total	52.1%	47.9%

Variable		commuting	not commuting
Education	primary and lower secondary	13.5%	86.5%
	basic vocational	47.3%	52.7%
	upper secondary	51.2%	48.8%
	tertiary	72.5%	27.5%
	total	56.3%	43.7%
Net monthly income per household in PLN	<2,000	29.4%	70.6%
	2,001–4,000	60.6%	39.4%
	4,001–6,000	62.7%	37.3%
	6,001–9,000	78.1%	21.9%
	9,001–12,000	91.2%	8.8%
	>12,000	54.1%	45.9%
	total	56.3%	43.7%
Area of residence	second ring	61.4%	38.6%
	third ring	52.1%	47.9%
	total	56.3%	43.7%
Type of respondents	in-migrants	65.1%	34.9%
	non-migrants	49.0%	51.0%
	total	56.3%	43.7%

Source: Own survey

Tab. 3: Socio-demographic features of respondents

Employment of women is also influenced by the size and structure of the local labour market. The development of the service sector, where most women find jobs, is of key importance. The larger the place, the more the sector of services is developed. Therefore, it is easier for women to find work in Cracow and its surroundings than in smaller towns, such as Myślenice, Kalwaria Zebrzydowska and in rural areas on the outskirts of the CMA.

Another factor worth considering is the age of commuters (Table 3). The study divided respondents into economic age groups with additional subcategories (The cohort of mobile working age was divided into three additional subgroups, i.e., 18–24 years, 25–34 years and 35–44 years.), which allowed for a more detailed analysis of this demographic feature. The results reveal that the highest percentage of commuting respondents was recorded in the mobile working age (64.5%) and especially in the age group 25–34 (over 71%). The high percentage of commuters, both women and men, in this age group may be due to a lack of factors hindering mobility. These include having a family, especially children. Previous studies (KUREK, RACHWAŁ & WÓJTOWICZ 2014) show that 56% of respondents aged 24–29 are childless and 19.5% do not plan to have children due to the lack of an appropriate person to start a family with. From an economic point of view, having no

family and children increases one's mobility, especially in the case of women. They can afford to commute to work on farther distances. In addition, young people in this age cohort usually have just entered the job market (after graduation from universities), so they want to gain the experience they need to further develop their careers. Therefore, when deciding to take up a job, they usually choose it based on availability and only later, after gaining some experience, they become more 'picky' or selective and begin to take other factors into account when choosing a job and its location.

An analysis of the relationship between commuting and education level provides some interesting insights (Table 3). Research shows that the percentage of commuters was higher among people with higher education. By comparison, only 13.5% of respondents with the lowest professional qualifications commute to work while 72.5% of respondents with higher levels of education do this. The percentage of commuters among persons with vocational and secondary education was similar.

Such large disparities in the percentage of commuters with the lowest and highest professional qualifications result from their age and their type of work. The low percentage of commuters is among respondents with primary and junior secondary education; this is primarily due to the age structure of the respondents. This group included mainly young people aged 18 who still continue their education and have not started to work yet. The other group consisted of elderly people who were already retired. Also the high proportion of commuters among respondents with the highest qualifications was primarily due to the lack of jobs requiring appropriate qualifications in rural areas.

A similar trend was observed when analysing commuters in relation to net income per household (Table 3). The higher the income, the higher the percentage of commuters. People with the lowest income were both seniors and young people still learning and still living with their parents and siblings and continuing their education at school or university.

Another factor influencing the level of commuting was the origin of the respondents. Migrants were more mobile than permanent residents of the CMA. Over 65% of respondents who migrated here from cities were commuters and the percentage of commuters among the permanent residents was only 35% (Table 3). Migrants changed their place of residence but did not change jobs. It means that they took into account the need to commute when they were deciding to move out from Cracow or another urban place and live in the suburban area. Our research shows that very few (6%) moved to the second ring because of their job (KUREK, GAŁKA & WÓJTOWICZ 2014).

To test the significance of the relationship between the mobility of the population expressed by commuting to work and selected socio-demographic variables, i.e. gender, age, education, level of income, the main source of income, area of residence, type of inhabitants and the distance between the place of work and the place of residence, the independence test χ^2 - chi-square of two variables was carried out for all respondents. Analyses were considered statistically significant at $p < 0.01$. A significant test allows to reject the null hypothesis and the alternative hypothesis agreeing on the essential relationship between the analysed variables. To deepen the analysis and measure the strength of this compound, Phi statistics was also calculated for tables 2x2 with a degree of freedom $df = 1$, and V-Cramer for tables larger than 2x2 with a degree of freedom $df > 1$. The results of both indicators

were considered poor if they were below 0.25, moderate if it were in the range of 0.25–0.40, strong when assuming a value from 0.41 to 0.56 and very strong if their values are higher than 0.56. The test results of different variables is presented in Table 4.

Variables	χ^2	df	Phi/ V-Cramer's****
Gender**	32.619	1	0.15
Age**	197.052	4	0.36
Education**	134.507	3	0.3
Main income source**	568.383	6	0.61
Net monthly income** per household in PLN	143.807	4	0.31
Type of inhabitants**	39.864	1	-0.16
Zone**	13.4	1	0.09
Distance from home** to work	1521	11	1

* N=1521

** p<0,01

***Phi computed for 2x2 tables with df=1. V-Cramer's computed for tables more than 2x2 with df>1

Source: Own survey

Tab. 4: Chi-Square test of independence of commuting to work by selected variables*

In all cases it was possible to reject the null hypothesis and to adopt an alternative hypothesis about the dependence of commuting on selected demographic and social variables.

The statistical calculations presented above show that the strength of the association between the analysed variables measured with the use of Phi statistics indicates the existence of a weak relationship between commuting and gender. It turned out that men more often commuted to work than women. The analysis also shows that there was a weak association between commuting and the type of residents and the area of residence, which can be explained by the fact that in the metropolitan area not only migration history of individuals and area of residence affect mobility but other factors as well, i.e. the size of the local labour market, the distance from the city centre, etc.

In contrast, moderate association existed in the case of testing the relationship between commuting and (a) age, (b) monthly income levels, and (c) education. This means that people at a younger age, with medium and high income, commute more likely to work than older people with lower incomes and lower education.

Finally, there was a very strong association between commuting and the main source of income (Cramer's V=0.61), and the distance from the place of residence and the town of work (V-Cramer = 1). This means that the number of those commuting longer distances

is lower than commuting over short distances. Presumably this is due both to the lack of profitability of commuting long distances in terms of finance and time. In addition, it is associated with a different functional type of areas located more distant from the city centre, i.e. villages from Cracow over 50 km are mostly agricultural in nature.

When we analysed the trends in commuting in relation to the type of inhabitants and area of residence, we learned that migrants commuted mainly to Cracow, regardless of their area of residence (Table 4). However, these links were stronger among migrants living in the suburban area, where 87.7% commuted to Cracow. At the same time, in the commuting zone only 53% of the migrant population commuted to work to Cracow, which was probably due to the distance and availability of jobs in the surrounding area. In analysing the commuting trends of permanent residents, it was observed that they were much more diversified, depending on the zone of residence. The permanent population from the suburban area is more linked with Cracow than other localities. The opposite situation occurs in the commuting zone, where only 39.6% of the permanent residents commute to work in Cracow, and the vast majority gravitated to other places.

An average distance of commuting to Cracow did not change significantly from Socialist times till present. According to research made by GAWRYSZEWSKI (1989) it amounted at 25 km in 1978, 23 km in 1983, while according to authors' survey it recorded only a slight decrease to 22 km in 2013 (Table 5). Decline of the public bus transport as well as economic suburbanisation associated with moving work places outside the city and the development of local labour markets had an impact on average distance of commuting despite of vast increase of car users. However, the average distance of commuting in the Cracow Metropolitan Area was even shorter, amounting at 19 km (Table 5).

Average distance total	19
Second ring	24
First ring	15
Commuting to Cracow	22
Gender composition	
Males total	21
Females total	18
First ring – males	15
First ring – females	14
Second ring – males	26
Second ring – females	23
Age composition	
Aged 18–24	18
Aged 25–34	20
Aged 35–44	21
Aged 45–54	18
Aged 55–64	17
Aged 65+	13

Education	
Primary and lower secondary	15
Basic vocational	19
Upper secondary	20
Tertiary	19
Income (PLN/person)	
below 2,000	18
2,000–4,000	21
4,000–6,000	19
6,000–9,000	20
9,000 and more	17
Non-migrant residents	20
Migrant residents	19
Mode of transport	
Own car	20
Private bus	20
Park and ride	13
Other	29
Public transport	17

Source: Own survey

Tab. 5: Average distances to work by variables (in kilometres)

The proportion of males and females among commuters to Cracow was similar (over 60% of men and women), while the feature, which had an impact on the directions of commuting was the age of the respondents. It turned out that the number of commuters to Cracow decreases in older age groups. For example, as much as 72.4% of respondents aged 18–24 worked in Cracow, while at the age of 45–59/64 only 60.2% commute to work in Cracow.

Research has also shown that the levels of education and income of the population also influence the direction of commuting. Better educated people and persons with higher incomes more often worked in the central city than those with lower levels of education and income. For example, among people with higher education up to 74.8% of the respondents commute to work in Cracow, and among people with vocational education only 52.6%.

To test the significance of the relationship between the direction of travel to work and selected social-demographic variables, i.e. gender, age, education, income level, area of residence and type of residents, tests of independence of two variables χ^2 - chi-square were conducted (Table 6). In order to check the strength of this association, Phi and Cramer's V measures were calculated. The results of both indicators were considered poor if they were below 0.25, moderate if it were in the range of 0.25–0.40, strong when showing a value from 0.41 to 0.56 and very strong if their values are higher than 0.56.

Variables		Destination		Total	χ^2	df	Phi/ Cramer's V****
		Cra-cow	Other place				
Gender	Female	306	152	458	1.429	1	-0.041
	Male	251	148	399			
Age	18–24	42	16	58	6.507	4	0.087
	25–34	169	86	255			
	35–44	170	90	260			
	45–59/64	154	102	256			
	60/65+	22	6	28			
Education	Primary and lower secondary	7	3	10	35.982	3	0.205
	Upper secondary	139	102	241			
	Tertiary	311	105	416			
	Basic vocational	100	90	190			
Income**	<2,000	51	48	99	36.408	4	0.206
	2,001–4,000	204	142	346			
	4,001–6,000	171	83	254			
	6,001–9,000	88	19	107			
	>9,000	43	8	51			
zone**	Third ring	199	230	429	130.72	1	0.391
	Second ring	358	70	428			
type of inhabitants**	Immigrant	321	132	453	14.537	1	-0.130
	Permanent	236	168	404			
Zone and type of inhabitants***	Immigrant (commuting zone)	115	102	217	7.711	1	-0.134
	Permanent (commuting zone)	84	128	212			
	Immigrant (suburban zone)	206	30	236	5.104	1	-0.109
	Permanent (suburban zone)	152	40	192			

* N=857

** p<0.01

*** p<0.05

**** Phi computed for 2x2 tables with df=1. V-Cramer's computed for tables more than 2x2 with df>1

Source: Own survey

Tab. 6: Impact of socio-demographic variables on directions of commuting

Research showed that only some variables, i.e. income level, area of residence and type of residents had significant influence on the directions of commuting ($p < 0.01$). Moreover, tests of independence χ^2 calculated for permanent residents and migrants in different areas and directions of commuting also proved to be statistically significant at $p < 0.05$.

The strength of the association, as measured by Phi and Cramer's V, turned out to be moderate in the case of the residential area and directions of commuting (Cramer's V = 0.39), while in other cases it was poor.

5 Conclusions

Commuting to cities in Poland is not a new phenomenon associated with the process of suburbanisation developing since the mid-1990s. Commuters on a relatively large scale were present also in the Socialist period, due to the lag of urbanisation for strenuous industrialisation. Cities during the Socialist period, despite the vigorous population growth, were not able to absorb all employed people located in their area factories, which conditioned the occurrence of daily commuting. It should be noted, however, that they included mainly the least-skilled part of the workforce, delivered to work with the nearby rural areas, often joining work with running a small farm, mostly for their own needs.

The restructuring of industry and the collapse of many companies in the first half of the 1990s ended the Socialist model of commuting to work, as the first 'victims' of employment restructuring were mostly commuters. Along with economic development and improvement in the second half of the 1990s, suburbanisation increased. It determined the emergence of a new capitalist model of commuting to work, which is much more diverse in terms of demographic and socio-economic structure of commuters and commuting directions.

The analysis of employee mobility in the Cracow Metropolitan Area showed on the one hand an increase in the intensity of commuting to work in the period 2006–2011 and on the other a diversified structure in commuting patterns showing the signs of post-suburbanisation. On the one hand, employment decentralisation and growing suburbanisation has led to greater dispersion and complexity of mobility patterns and an increase of trips from the core city to outer areas. It may indicate the development of metropolisation and the growing importance of functional relationships between Cracow and other urban centres – not only near and local but also large ones in Poland. On the other hand, the progressive residential suburbanisation resulted in increased commuting to Cracow, both from the suburban area (the first ring) and the commuting zone (the second ring). At the same time there was an increase of commuting from the core to the first ring and within the suburbs, which indicates the relocation of some jobs outside the central city (economic suburbanisation). There was also the establishment of local labour markets in smaller urban centres of the CMA and in some rural municipalities (Zabierzów) associated with the relocation of some companies and plants from Cracow. We believe that with the further development of suburbanisation the intensity of commuting will increase, and the directions of commuting will be even more complex because of the decentralisation of industry and services. It will

be a challenge for the public transport system to adapt its functionality to meet the needs of residents and to encourage them to use public transport instead of private cars (e.g., by creating networks of Park & Ride parking lots on the outskirts of the central city; CLAYTON et al. 2014).

In the light of surveys, the research of functional and spatial relationships measured by commuting confirmed that in-migrant residents and people living in the suburban area have the strongest connections with Cracow, although in the second ring the proportion of commuting to Cracow was much lower. These links were stronger for respondents with higher levels of education and income. Nowadays more commuters have higher education while before socio-economic transition commuters with primary and basic vocational education prevailed (WIŚNIEWSKI 2013).

Intensive residential suburbanisation without changing place of work also contributed to an increase of commuting in adjacent municipalities. Respondents of retirement age with a lower level of education, mostly permanent residents of the commuting zone, had more commuting links with other places than Cracow. Residents of the metropolitan area, regardless of the zone of residence, mostly commute to work by car. Apart from changes in the educational level of commuters, the development of the automotive industry and the increase in the number of car owners was the main hallmark of socio-economic characteristics of commuting.

To sum up, it must be stated that in a post-Socialist city not being the capital of a country, still the most prevailing direction of commuting is to the city core. However, the study showed that an increasing proportion of commuters travel to other places located in the first or even second ring. Cracow, a former industrial city, recorded significant development of the service sector in the central city but also in the fringes. Relocation of some industrial plants outside the city and the development of shopping centres, recreational facilities, foreign investments in Economic Activity Zones and Business Parks generated new jobs in the suburbs. Thus, post-suburban development followed residential suburbanisation creating clusters with a high degree of independence from the historical city centre.

Our case study demonstrated that in comparison with the larger capital cities of transformation countries, diversification of commuting patterns leads to similar post-suburban development, adding the specificity of the CMA of a declining industrial function in the city core replaced by the development of business services and the tourism sector and concentrating the investment in economic zones redistributed in the fringes of the metropolitan area.

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