

Suburbanization in Poland and Its Consequences: A Research and Analytical Perspective on the Phenomenon

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Abstract

On the basis of their own research, observations and an extensive review of the literature on the subject, the authors underline the complexity and multidimensionality of suburbanization and the diversity of its forms across the world. The effects of suburbanization form one of the key challenges to be faced by Polish cities, for which the post-1989 political and social transformations have been a time of destabilized spatial development. This has been largely a consequence of the far-reaching deregulation of spatial planning and changes in the lifestyle of city residents. The voluminous foreign literature on the subject identifies an array of costs associated with urban sprawl. The alarming scale of its adverse effects also emerges from a number of domestic studies. The authors of this paper focus on highlighting the actual challenges of uncontrolled suburbanization in Poland. Following this, drawing on the most seminal US studies on suburbanization and estimates of Polish researchers, they attempt to systematize knowledge about the economic, social and environmental impacts of suburban spatial chaos. They shed new light on the phenomenon of suburbanization and identify—sometimes contrary to what may be expected—non-obvious beneficiaries and victims of the process.

Keywords: suburbanization, urban sprawl, implications of suburbanization, costs of suburbanization, suburbanization in Poland

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Introduction

The progressive advance of urbanization processes determines the development of urban systems in spatial, demographic, economic, social, legal, and environmental terms. Regardless of how it is defined, urbanization is a global phenomenon that is driven by socio-economic development which not only affects cities themselves but also the surrounding areas (M. Dawid 2021). In 1938, Louis Wirth proposed a new approach to urbanization in his essay entitled “Urbanism as a Way of Life,” which offered a broader picture of suburbanization than just that of a process involving population growth and the spatial development of cities. Ever since, in addition to being treated holistically, urbanization has also been looked at in the context of its various aspects, such as demography, society, economy, or migration (Szymańska and Biegańska 2011). Many researchers observe that present-day urbanization has taken the form of rapid urban expansion also known as “urban sprawl,”—i.e., the growth of extensive suburbia as a result of scattered development that “spills” beyond the administrative borders of cities (Ziółkowska 2020). In addition to entailing the spatial development of cities, suburbanization as a phase in urbanization processes also involves

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the relocation of urban functions to rural areas (Harasimowicz 2018). According to Lisowski and Grochowski (2008), such transfer of urban spatial forms and urban life to the periphery builds functional connections between the suburbs and the center of a city. By contrast, a slightly narrowed definition of suburbanization emphasizes the decentralization of a city region whereby residents and businesses move from the center to suburban areas (Kurek, Gałka, and Wójtowicz 2014).

The aim of the article is to identify the complexity and multidimensionality of suburbanization by systematizing the sources of knowledge about the consequences and costs of this phenomenon (the economic, social and environmental implications of suburban sprawl). This article also concerns the non-obvious beneficiaries and victims of the process. The effects of uncontrolled suburbanization form one of the key challenges to be faced by Polish cities, for which the post-1989 political and social transformations have been a time of destabilized spatial development. The main problem is uncontrolled urban sprawl. This has been largely a consequence of the far-reaching deregulation of spatial planning and changes in the lifestyle of city residents.

The research method behind the article consists of extensive systematic review of the literature on the subject, based on a survey of available sources related to research on the costs of suburbanization, as well as the researchers' own studies and observations. Its basis is the verification of continuous publications, mainly in the form of scientific articles and reports. The authors analyzed cross-sectional Polish and foreign studies, trying not to omit any key publications on this topic. The first step in the research method used was to determine the set of publications that were the subject of the analysis. The selection of basic literature on the subject was based on the use of full-text databases found by means of keyword searches. The second stage of the study — i.e., the expansion of the literature base, was based on the Snowball Sampling technique and consisted in locating articles listed in the reference literature. The next, third stage of the study was the selection of the collected publications, which involved removing repetitive items and cataloguing the obtained material. The literature review shows that the latest available publications on the topic discussed draw on previous conclusions and paradigms, containing knowledge obtained in the previous research and expanding it with new conclusions. Both foreign and Polish literature on the subject indicates a multitude of consequences and costs associated with chaotic suburbanization. However, despite many review studies that have already been conducted on this topic, there is still no in-depth work indicating the difficulty in estimating the fiscal effects and the scale of the phenomenon of development sprawl. In many cases, a thorough analysis of the issues discussed makes it possible to conclude that previous attempts to estimate the financial scale of the phenomenon were often based on too simplified assumptions.

1 The multi-faceted nature of suburbanization

According to Koj (2020), suburbanization is a spatial phenomenon with a global reach, which is mainly observable in developed economies and post-socialist countries that aspire to acquire this status. Suburbanization has intensified since the 1950s, mainly in North America and Western Europe (Brzeziński 2010). Drawing on an overview of sources and findings from the above project, the authors of the present paper emphasize that these processes are not homogeneous and their diversity manifests itself in different conditions under which they occur, their various courses, and the multiplicity of their consequences. This may concern both the scale and dynamics of the phenomenon and the social structures or spatial layouts of building development. However, it can be expected that globalization and tightening of international relations may level out the distinctive features of urban sprawl worldwide (Koj 2020).

1.1 The USA — the cradle of suburbanization

When thinking about suburbanization, the suburbs of American cities will be the first association that comes to mind. US urban development processes have been most extensively studied and documented by a large volume of empirical studies. According to Palak (2016), suburbanization, as it has developed in the US, has a long history and can be divided into five main periods. The first one, observable in the late 19th century, comprised the rapid development of suburbia along

railway lines as a result of the rising number of commuters. Subsequently, the 1920s saw significant deconcentration of cities and a resultant surge in the demand for private cars. The development of suburbia slowed down during the Great Depression and World War II. The time just after the end of the war saw the fourth stage, which was notable for a rise in the need for housing. The last period distinguished by Palak comprised the rapid development of industry in suburban areas, which, in turn, made the latter dependent on their core cities in socio-economic terms.

American-style suburbanization is distinguishable for its large scale. Until the 1980s, urban sprawl was the predominant model of urban development in the US, with its characteristic extensive network of highways and expansive low-density housing development (Beauregard 2006). The suburbs of US cities are also distinguishable by having their own centers formed of office and other non-residential buildings (Palak 2016). This is confirmed by the fact that 50% of job vacancies in various sectors of the economy are located in the suburbs (Koj 2020). When analyzing the spatial aspect of the development of suburbs in the US, it is necessary to emphasize the tendency for American cities to suburbanize in the form of scattered development (Batty, Besussi, and Chin 2003). Initially, suburban development was distinguished by uniform structures also known in the literature as “serial suburbs.” In the 1970s, there was a dramatic turnaround in this respect. In response, *inter alia*, to a crisis caused by the unavailability of housing, developers built millions of suburban housing estates composed of detached houses or terraced or multi-dwelling buildings (Nicolaidis and Wiese 2017). The development of suburbanization in the US was equally strongly influenced by the social aspect related to the development of a suburban lifestyle as a manifestation of growing prosperity and wealth. Americans were moving out en masse from industrial and densely built-up cities in pursuit of their “American dream” in the suburbs (Beauregard 2006). Initially, suburbs were home to the wealthiest classes of American society. However, following the social diversification of the 1970s, poorer people also began to settle in suburban areas (Nicolaidis and Wiese 2017). Over time, following a series of historical developments—i.e., the deindustrialization of suburbs in the 1970s and 1980s and the ensuing mass job losses, along with the post-2000 economic declines, suburban populations were affected by a growing trend of economic inequality (Nicolaidis and Wiese 2017). As shown by poverty and unemployment statistics, contemporary suburbanization patterns in America are among the factors behind a generally observable economic segregation of suburbs (Yang and Jargowsky 2006).

Documenting and understanding suburbanization has been instrumental in addressing the extremely important topic of identification and assessment of the actual implications of this process. The issue was addressed as early as in the 1980s by a team of American researchers, whose work translated into three comprehensive publications released by the Real Estate Research Corporation (in the year 1984) and the National Academy Press (in 1998 and 2002).¹ The researchers investigated the phenomena and causes of urban sprawl and proposed a cost-effective and optimal model for suburban development. Their work was a stimulus for the authors of the present article to compile an overview of relevant literature in order to further knowledge on the actual and quantifiable costs of suburbanization and to verify whether creating an objective and reliable tool for calculating these costs is possible.

1.2 Suburbanization processes in Europe

Once they embarked on their research and completed a survey of relevant literary sources, the authors of this paper and the entire research team became convinced that suburbanization had proceeded in a radically different way in Europe from the way it had done in the USA (Koj 2020). On the Old Continent, suburbanization was first observed in the second half of the 20th century in France and Great Britain (Palak 2016). While in the USA suburbs grew in undeveloped and

1. See: “Costs of Sprawl—2000.” Report by Robert W. Burchell et al., Transit Cooperative Research Program (TCRP) Report 74, Transportation Research Board, National Research Council, Washington, 2002, available at <https://www.trb.org/Publications/Blurbs/160966.aspx>; See: “The Costs of Sprawl—Revisited.” Report by Robert W. Burchell et al., Transit Cooperative Research Program (TCRP) Report 39, Transportation Research Board, National Research Council, Washington, 1998, available at https://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_39-a.pdf.

open areas, in Europe suburbanization proceeded at the expense of well-modeled, traditional, and compact urban setups (Mantey 2011).

Importantly, the evolution of urban sprawl has differed considerably from one part of the continent to another. In this respect, researchers emphasize the differences between Western Europe and the countries of the former Eastern Bloc (Koj 2020). In Central and Eastern Europe, suburbanization processes, which emerged only after the 1989 political transformation, have been much less extensive, with suburban populations mainly consisting of poorer or less qualified people who cannot afford to live in the city center (Palak 2016). The range and scale of suburbanization processes have mostly been determined by the demographic stagnation that accompanied the political change and the post-1989 economic transformations (Repaská, Vilinová, and Šolcová 2017). When analyzing the spatial aspect, attention should be drawn to the fact that suburbanization has radically reshaped the urban areas of Eastern Bloc countries, giving rise to functionally diverse and highly dispersed building development. In addition, the process has been highly decentralized and based on private ownership, which has added to the chaotic spread of urban building development (Sýkora and Stanilov 2014). The resultant spatial disarray has been the subject of wide-ranging research and public debate.

1.3 Suburbanization as a challenge to Polish cities

Many researchers find the course of suburbanization in Poland to be typical of post-socialist countries (Koj 2020), although it also displays certain individual characteristics. As Kajdanek (2011) believes, the main feature that sets Polish suburbanization apart from West-European processes is the lower scale and intensity of the phenomenon. Notwithstanding their short history, the dynamics of suburbanization processes in Poland are high, and the new suburbs have managed to change the image of Polish space. They have also influenced changes in the lifestyle of people living outside cities. Typically, Polish suburbs are located relatively close to the center (Palak 2016), so it might seem to an outsider that they actually form part of the core city. A large proportion of the earliest suburban housing estates, which were built in the early 1990s and imitated the architecture of western suburbs, border on block housing estates, filling the space between suburban villages and expansive neighborhoods in cities. They thus create a mosaic of modern houses, blocks of flats, rural buildings, narrow streets without pavements, small rural shops, workshops, and often also farm buildings and arable fields, all of which are characteristic of the outskirts of Polish cities. This mix of urban and rural features distinguishes Polish suburbs from their western counterparts (Więclaw-Michniewska 2006). The social structure of Polish and western suburbs differs, too (Kajdanek 2012; Ouředníček 2007; Szelényi 1983). It should be noted that the low population density of suburban areas and significant dispersion of the urbanized fabric renders Polish suburbs similar to American suburbia (Palak 2016).

Urban sprawl in Poland is characterized by an uneven distribution of its intensity across the country (W. Dawid 2021). Suburban areas grow most intensively around large cities (Mayer and Szmytkie 2014). Metropolitan areas were the first to experience rapid suburbanization, following which the same process began to be observed in the immediate vicinity of smaller urban centers (Zborowski and Raźniak 2013). The pace of suburbanization is faster in cities and municipalities that offer attractive living and working conditions (W. Dawid 2021). On the basis of their research, the authors conclude that suburbanization is currently an almost universal, nationwide phenomenon in Poland, which, in addition to affecting the fringes of major Polish cities, where it displays the greatest dynamics and intensity, is also increasingly noticeable around medium-sized cities, and even some small towns. The research has identified a clear interdependence between the depopulation and suburbanization of Polish cities. The dynamization of these phenomena has bolstered interest in the subject, as a result of which many researchers in fields such as urban planning, architecture, sociology and economics have turned their attention to the subject.

There is a large number of articles and studies focusing on the consequences of these processes for local governments and their inhabitants. Their authors not only identify the negative features of migration to the suburbs but also try to indicate their broader context, an example of which is the book by Kajdanek (2011). However, the discussion on suburbanization is dominated by voices

expressing fear that changes in space would prove to be extremely costly for the entire society. In Poland, the problem of the actual costs of suburbanization was first noted by researchers from the National Academy of Sciences. The work of a team of NAS experts resulted in a 2012 report that identified the economic and social losses of uncontrolled urbanization in Poland.² Most importantly, the results were supported by specific calculations since the authors relied on planning documents. These issues were developed in a three-volume study edited by Kowalewski, Markowski, and Śleszyński (2018). Examples of the financial implications of suburbanization were also described by Markowski,³ who focused on the costs related to commuting or designating large suburban areas for housing development. The above research has inspired a number of case studies aimed at identifying the direct economic impacts of ineffective, scattered suburbanization both for metropolitan municipalities (Łuków 2016; Smutek 2016)⁴ and smaller cities (Cyran 2016). However, many researchers have drawn attention to a number of difficulties in identifying and estimating the specific costs related to uncontrolled sprawl. Usually, this is due to the inconsistency between the measurement methods employed by researchers (Chin 2002) or their analyzing solely the costs of suburban life for the residents while disregarding the costs borne by the city (Windsor 1979). Often, in addition to the city's spatial layout itself, economic and political conditions may also influence the projected costs of suburbanization.⁵

2 The impacts of suburbanization

The literature clearly distinguishes three main categories of the impact of suburbanization, namely (1) economic, (2) social, and (3) environmental ones (table 1 on next page). These have been widely addressed in Poland and other countries both by scholars and the media (Dawid, Dawid, and Kudłacz 2021). The literature on this topic focuses mainly on the negative consequences of the phenomenon. This is due to the difficulty of identifying its positive consequences for the general public at the level of local and supra-local governments. Possible positive changes, such as those resulting from the improvement of the housing situation of migrants, are extremely difficult to assess using research methods of sciences bordering on spatial economics or urban planning. Many of the positive aspects of life outside the city, such as a healthy living environment and improved public health, which results in urban areas being healthier to live in than rural ones (Harris 2015), have become obsolete. This has made their real assessment in terms of financial consequences impossible. They require in-depth sociological studies, such as interviews and surveys among a large research group, which is why they are rare.

Returning to the fundamental question whether suburbanization has positive effects in economic terms, both at the level of individual resident and local government costs, the answer is ambiguous. It is especially difficult at the level of individual households, because the budget and individual expenses depend on personal preferences and lifestyle. In his article entitled “Living in Sprawling Areas: a Cost–Benefit Analysis in Poland,” based on previous studies—i.e., Anas and Rhee (2007),

2. See: “Raport o ekonomicznych stratach i społecznych kosztach niekontrolowanej urbanizacji w Polsce” [Report on the economic losses and social costs of uncontrolled urbanization in Poland]. Instytut Geografii i Przestrzennego Zagospodarowania PAN, Fundacja Rozwoju Demokracji Lokalnej, October 29, 2013, available at <https://odpowiedzialnybiznes.pl/wp-content/uploads/2014/07/Raport-Ekonomiczny-29.10.2013-calosc.pdf>.

3. See: “Ekonomiczny wymiar urbanizacji” [The economic dimension of urbanization]. Chapter 7 (pages 129–144) in “Przestrzeń życia Polaków” [The living space of Poles]. Report by Czyżewski Adam et al., available at https://ruj.uj.edu.pl/xmlui/bitstream/handle/item/8864/sepiol_przestrzen_zycia_polakow_2014.pdf?sequence=1&isAllowed=y;.

4. See also: “Analiza i prognoza dochodów i wydatków publicznych w Polsce Zachodniej, województw: zachodniopomorskiego, lubuskiego, wielkopolskiego, dolnośląskiego i opolskiego” [Analysis and forecast of public revenues and expenses in Western Poland, the following voivodships: Zachodniopomorskie, Lubuskie, Wielkopolskie, Dolnośląskie i Opolskie]. Ekspertyza do strategii Polski Zachodniej wykonana na zlecenie Zachodniopomorskiego Urzędu Marszałkowskiego [Expertise on the Western Poland strategy commissioned by the Zachodniopomorskie Marshal's Office] by Jacek Batóg, Szczecin, April 2011, available at <https://wrot.umww.pl/wp-content/uploads/2015/09/Analiza-i-prognoza-dochodow-i-wydatkow-publicznych-w-Polsce-Zachodniej.pdf>.

5. See: “The Costs of Sprawl Reconsidered: What the Data Really Show.” Report by Joshua Utt and Wendell Cox, Background No. 1770, The Heritage Foundation, Washington DC, June 25, 2004, available at <https://www.heritage.org/report/the-costs-sprawl-reconsidered-what-the-data-really-show>.

Table 1. Examples of the impacts of suburbanization as distinguished by foreign and Polish researchers

(1) Economic impacts	Researchers
The expansion of suburban infrastructure (i.e., the development of road, water and sewage networks)	Archer (1973), Altshuler (1977), Duensing (1977), Windsor (1979), Peiser (1984), Duncan (1989), Frank (1989), Burchell (1992–1997), Altshuler and Gomez-Ibanez (1993), Carson (1998), Thompson (2013), Żróbek-Róžańska and Wolny (2017)
Public operating costs (i.e., those resulting from zoning plans related to the operation of schools and public utility buildings, the maintenance of parking lots or excessive use of roads)	Real Estate Research Corporation (RERC) (1974), Duncan (1989), Burchell (1992), Ladd (1992), Altshuler and Gomez-Ibanez (1993), Burchell, Listokin (1994), Gordon and Richardson (1997), Wassmer and Bass (2004), Shoup (2005), Sanchez-Reaza (2012), Kowalewski et al. (2013), Heffner (2016)
Increased expenses associated with the maintenance of buildings/facilities (i.e., private ones that serve various functions)	Downs (1973), Schafer (1975), Seidel (1978), Windsor (1979), Burchell (1992–1997), Avin (1993), Burchell and Listokin (1994), Burchell and Moskowitz (1995)
The economic decline of city centers (including limited influx of investors)	Lisowski and Grochowski (2008), Kowalewski et al. (2013)
An increase in land conversion costs (including speculation in suburban land)	Burchell (1992–1997), Landis (1995), Lisowski, Grochowski (2008), Kowalewski et al. (2013)
Increased road traffic (including an increased number of car trips and related private expenses)	Cervero (1986), Handy (1992, 1995), Kenworthy, Newman (1993), Dunphy and Fisher (1994), Frank and Pivo (1994), Holtzclaw (1994), Kitamura et al. (1994), Ray et al. (1994), Vincent et al. (1994), Cervero and Gorham (1995), Litman (1995), Young (1995), Cervero and Wu (1996), Parsons Brinckerhoff (1996), Dunphy et al. (1997), Gordon and Richardson (1997), Ewing (1997), Cobb (1998), Sýkora and Ourednek (2007), Jeżak (2011), Małek (2011), Kamal-Chauoi and Sanchez-Reaza (2012), ^a Thompson (2013), Kowalewski et al. (2013), Markowski (2015), Litwiński (2016), Hołuj (2017), Larson and Zhao (2020)
(2) Social impacts	Researchers
Extended commuting times (including increased dependence on individual transport)	Purvis (1994), Ewing (1995), Litman (1995), Dunphy et al. (1997), Gordon and Richardson (1997), Lisowski and Grochowski (2008), Kowalewski et al. (2013), Litwiński (2016), Hołuj (2017)
Higher incidence of obesity, diabetes and other chronic diseases (including those caused by permanent stress)	Koslowsky and Krausz (1993), Cox and Utt (2004), Department of Health, Physical Activity, Health Improvement and Protection (2011), Thompson (2013), Walker (2018)
Increased number of road collisions (including fatal accidents)	Voorhees (1992), Ewing, Schieber and Zegeer (2003), Thompson (2013)
Increased risk of social isolation, segregation and exclusion (including conflicts between local and immigrant populations)	Salamon (2003), Lisowski and Grochowski (2008), Handcuffs (2011), Thompson (2013), Palak (2016), Stelmaszewska (2020)
Increased employee absenteeism (with simultaneous reduced productivity)	Thompson (2013)
Social problems caused by the lack of adequate infrastructure (technical and social)	Heimlich and Anderson (2001), ^b Czarnecki (2011) Harris (2015), Heffner (2016)

Continues on next page

Table 1. continued

(3) Environmental impacts	Researchers
Shrinkage of open countryside areas and agricultural land (including reduced agricultural productivity)	Lisansky (1986), Lopez et al. (1988), Adelaja et al. (1989), Nelson (1992), Burchell (1992–1997), Burchell and Shad (1997), Ewing (1997), Gordon and Richardson (1997), Johnson (2001), Simon (2008), Celińska-Janowicz (2011), Wilson and Chakraborty (2013), Żróbek-Róžańska and Wolny (2017)
Shrinkage of environmentally valuable areas (including natural and semi-natural areas) and fragmentation of ecosystems	Dahl (1990), Burchell (1992–1997), Margules and Meyers (1992), Johnson (2001), Czerny (2005), Lisowski and Grochowski (2008), Simon (2008), Heffner (2016)
Reduced diversity of species (fauna and flora)	Johnson (2001), Simon (2008)
More pollution (air, water and vegetation)	Johnson (2001), Czerny (2005), Badyda and Majewski (2006), Campbell et al. (2007), Lisowski and Grochowski (2008), Wilson and Chakraborty (2013), Graboś et al. (2014), Żróbek-Róžańska and Wolny (2017), Hołuj (2017)
Change in the characteristics of the suburban climate (including the expansion of heat islands and the number of days with extreme heat)	Wilson and Chakraborty (2013), Ciszewska (2019)
Changes in the hydrographic network of an area (including the drying of river beds)	Simon (2008), Wilson and Chakraborty (2013)
Increased flood risk (including an increased outflow of surface water)	Johnson (2001), Wilson and Chakraborty (2013), Kowalewski et al. 2013
Increased consumption of energy (including transmission losses) and water by households	Johnson (2001), Lisowski and Grochowski (2008), Wilson and Chakraborty (2013)
Decline in landscape aesthetics (degradation of space and displacement of rural scenery)	Bruchell et al. (1998), Lisowski and Grochowski (2008), Osman, Nawawi and Jamalunlaili (2009), Żróbek-Róžańska, Wolny (2017)

Source: (Dawid, Dawid, and Kudłacz 2021).

^aSee: “Urban Trends and Policies in OECD Countries.” Edited by Lamia Kamal-Chaoui and Javier Sanchez-Reaza, OECD Regional Development Working Papers 2012/01, available at https://www.oecd-ilibrary.org/urban-rural-and-regional-development/urban-trends-and-policies-in-oecd-countries_5k9fhnlctjr8-en.

^bSee: “Development at the Urban Fringe and Beyond: Impacts on Agriculture and Rural Land.” Report by Ralph E. Heimlich and William D. Anderson, Agricultural Economic Report No. 803, Economic Research Service, U.S. Department of Agriculture, Washington, June 2001, available at https://www.ers.usda.gov/webdocs/publications/41350/19084_aer803_1_.pdf?v=6125.1.

O’Toole (2009), Anas (2011), Kulmer et al. (2014), Mendonca et al. (2020), Lityński (2023) reports that the individual costs of living in the suburbs are offset by lower expenses. This applies to lower real estate and land prices or reduced commuting related to the evolution of migrants’ professional work, limiting the need to commute to the city core.

However, in the case of local governments, the opportunity to increase budget revenues from new taxpayers or the development of municipal infrastructure accompanying new buildings should be considered. Suburbanization is undoubtedly also a way to develop rural areas (Harris 2015).

3 Awareness of the costly consequences of suburbanization

The questions of *who*, *when*, and *at what level* will bear the costs related to suburban sprawl have intrigued many researchers. When estimating the costs of the sprawl, many of them tend to employ simplified divisions: private vs. public, indirect vs. direct, prolonged vs. one-off, cumulative vs.

relative costs, etc. In practice, however, assigning the costs of sprawl to a specific category is much more difficult because such costs are often distinguished on an arbitrary basis and depend on the researcher's perspective. The costs of suburbanization are multi-faceted in nature and intertwine. By adopting far-reaching simplifications, we can at best quantify the spatial consequences of the sprawl, mainly one-off costs, such as the construction of technical infrastructure (Dawid, Dawid, and Kudłacz 2021). Many researchers draw attention to the fact that although it is the individual costs incurred by residents on account of living in the suburbs that are most clearly noticeable in household budgets, they are also the least measurable because they differ from one household to another and depend on the lifestyle and characteristics of the household. By contrast, the public costs are spread over wider groups of people, which renders them less noticeable and measurable solely by reference to funds spent at the level of municipal budgets.

Table 2. Examples of estimates of the costs of suburbanization

Phenomenon studied	Financial impact	Study
Purchase of land for public roads and infrastructure as foreseen by zoning plans	PLN 40–59 billion	Kowalewski et al. (2013)
Purchase of land for public roads	PLN 41.3 billion	Kowalewski et al. (2013)
Purchase of land for public roads and infrastructure as foreseen by zoning plans	PLN 67 billion	Kowalewski et al. (2013)
Purchase of land for public roads and infrastructure as foreseen by zoning plans	PLN 129 billion	Olbrysz and Kozinski (2011) ^a
Lost revenues from taxes, planning fees and betterment levies	Relatively small impact estimated: PLN 8 billion	Kowalewski et al. (2013)
Estimates of forecast revenues and costs resulting from the provisions of valid zoning plans	Negative balance for two forecasting and implementation variants: PLN 38 billion, PLN 4.5 billion for 2015	Kowalewski, Markowski and Śleszyński (2018)
Costs of air pollution	USD 2.2 billion	Campbell et al. (2007)
Potential economic losses resulting from the siting of buildings in areas at risk of flooding	Based on the most recent large flood: EUR 2.9 billion	Kowalewski, Markowski and Śleszyński (2018)
Costs of severe air pollution	USD 102 billion	World Health Organization (2015) ^b
Health costs of pollution	PLN 6–18 billion	Badyda and Majewski (2006)
Cost of renovating buildings due to air pollution	PLN 40 billion	Graboś et al. (2014)
Costs of commuting to work over 5 km	PLN 25.9 billion annually	Kowalewski et al. (2013)
Costs of individual commuting to work over 5 km	PLN 22.6 billion annually	Kowalewski et al. (2013)
Public transport – costs of commuting to work over 5 km	PLN 3.3 billion annually	Kowalewski et al. (2013)
Commuting to work	Economic losses: 610 billion man-hours = PLN 8 billion when converted into money	Kowalewski et al. (2013)

^aSee: “Raport o finansowych efektach polskiego systemu gospodarowania przestrzenią” [Report on the financial effects of the Polish space management system] by Andrzej Olbrysz and Jacek Kosiński, Zespół badawczy “Finanse w urbanizacji,” Warszawa, 2011.

^bSee: “Economic Cost of the Health Impact of Air Pollution in Europe: Clean Air, Health and Wealth.” WHO Regional Office for Europe, Copenhagen, 2015, available at <https://www.who.int/europe/publications/i/item/WHO-EURO-2015-4102-43861-61759>.

Nevertheless, it should be emphasized that, appearances to the contrary, there are not many studies that offer concrete calculations of the financial implications of the sprawl. It is not feasible to develop an econometric analysis for such a spontaneous and chaotic process as suburban sprawl. More precise cost calculations, which are, in fact, calculations of lost income resulting from less effective use of space, have only been carried out by researchers from the United States. The authors of the article decided not to refer directly to these calculations for several reasons, including the lack of translation of these calculations to other administration systems. In many instances, calculations made to date do not incorporate multiple variables and are not based on adequate quality data that could be used as tools for modeling suburbanization. Analyses focused on individual phenomena in order to estimate their scale are of great value in understanding the scale of the negative consequences of suburbanization. Ideally, the results should make it possible for the scale of financial costs to be assessed. Such estimates (table 2) are useful in highlighting the significance of specific phenomena, but one should be careful in interpreting them and formulating hypotheses on the basis of stylized facts.

In order to calculate the costs of the individual economic impacts of suburbanization, the authors suggest dividing the costs into those that can be quantified in monetary terms and those whose parameterization will not produce specific, unambiguous numerical values but will only give a general picture of a given phenomenon. In order to prepare broader analyses use was made of costs quantifiable in monetary terms, i.e. those that take specific values, are calculable and are expressible through an estimate (table 3 on page 166). The largest group of the costs mentioned are those related to hard infrastructure investments, such as the expansion of roads and technical networks or land development. What is worth emphasizing is that, on the one hand, we are dealing with a group of costs related to creating something from scratch, and, on the other hand, with maintaining the existing or expanded infrastructure.

Table 3. Quantifiable costs of suburbanization

Cost of suburbanization	Financial dimension of the cost		
	Data	Method	Research assumptions (hypothesis)
Expansion of commuting roads	Price per km ² × commuting road length	Statistical analysis of the needs for road infrastructure	What are the needs of suburban municipalities for commuting roads? What costs does the construction of such commuting roads generate?
Expansion of internal roads	Price per km ² × internal road length	Statistical analysis of the needs for road infrastructure	What are the needs for internal roads within the suburban area? What costs does the construction of such internal roads generate?
Expansion of technical infrastructure	Price per km ² × length of technical infrastructure	Statistical analysis of the needs for technical infrastructure	What are the needs for technical infrastructure in the suburban area? What are the costs of constructing the technical infrastructure?
Construction of P&R facilities	Cost estimated on the basis of tender documents	Statistical analysis of the cost of building P&R facilities	What costs does the construction of P&R facilities generate for the city region?
Expansion of suburban transport infrastructure	Cost estimated on the basis of tender documents	Statistical analysis of the cost of expanding suburban transport infrastructure	What costs does the development of suburban transport generate for the city region?
Expansion of suburban railway infrastructure	Cost estimated on the basis of tender documents	Statistical analysis of the cost of expanding the suburban railway network	What costs does the expansion of the suburban railway generate for the city region?

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Table 3. continued

Cost of suburbanization	Financial dimension of the cost		
	Data	Method	Research assumptions (hypothesis)
Construction of public utility buildings	Cost estimated on the basis of tender documents	Statistical analysis of the cost of building a public utility building	What costs does the construction of a public utility building generate in the suburban area?
Maintenance of commuting roads	Financial assumptions of the municipality/city	Statistical analysis of the cost of maintaining commuting roads	What costs does the maintenance of access roads in the suburban area generate?
Maintenance of internal roads	Financial assumptions of the municipality/city	Statistical analysis of the survey of the cost of maintaining commuting roads; in-depth interviews	What is the cost of maintaining internal roads by the municipality and by private owners within the suburban area?
Maintenance of P&dR facilities	Financial assumptions of the municipality/city	Statistical analysis of the cost of maintaining a P&R facility	What are the costs of maintaining P&R parking lots in the city region?
Maintaining suburban transport	Financial assumptions of the municipality/city	Statistical analysis of the cost of maintaining suburban transport	What are the costs of maintaining transport and its facilities in the suburban area?
Maintaining the suburban railway	Financial assumptions of the municipality/city	Statistical analysis of the cost of maintaining the suburban railway	What are the costs of maintaining the railway and associated infrastructure in the suburban area?
Maintenance of public utility buildings	Financial assumptions of the municipality/city	Statistical analysis of the cost of maintaining public utility buildings	What costs does the maintenance of suburban public utility buildings generate?
Increased electricity and heat consumption		Statistical analysis of electricity consumption	Does the expansion increase electricity consumption and what are the associated costs?
Increased water consumption		Statistical analysis of water consumption	Does suburban expansion increase water consumption and what are the associated costs?
Lost tax revenue	Financial assumptions of the municipality/city	Statistical analysis of tax revenues	What is the impact of suburban expansion on the loss of tax revenues in the budget of the core city?
Increased (municipal) waste generation		Statistical analysis of waste collected during the year	Does suburban development increase the amount of (municipal) waste generated and what are the associated costs?

Based on the above compilations (tables 2 and 3), it can be concluded that uncontrolled suburbanization undoubtedly increases costs for the community. In addition, in some categories it can trigger what can be referred to as “a spiral of never-ending economic impacts” (Burchell et al. 2005).

Summary and conclusion

On the basis of the research carried out, the authors of the article showed that currently suburbanization in Poland is an almost universal, nationwide phenomenon and is increasingly visible also in the surroundings of medium-sized cities and even some small ones. The conducted research indicates a clear interdependence of the processes of depopulation and suburbanization of Polish cities. Despite its short history, the dynamics of suburbanization processes in Poland is high, and new suburbs have managed to change the image of Polish space. They have also led to changes in

the lifestyle of people living outside cities. The main problem observed in the Polish space is the uncontrolled growth of cities.

The literature on the discussed problem points to numerous consequences of the suburbanization process, as well as their resulting costs, which can be divided into economic, social and environmental ones. Despite many review studies on this topic, there is still no in-depth work indicating the difficulty in estimating the quantifiable effects of development sprawl. It seems that researchers of this phenomenon who try to calculate anew the real costs of suburbanization rarely pay attention to the methodology of the estimates already existing in the literature on the subject. According to the authors, this leads to oversimplification of these calculations and the lack of deeper analyses of the complexity of the phenomenon and its connections with other accompanying transformations of modern society.

Based on the observations made in the article, it can be concluded that uncontrolled suburbanization undoubtedly contributes to the increase in costs incurred by society. The analysis of the issues discussed allows us to conclude that previous attempts to estimate the financial scale of the phenomenon were often based on too simplified assumptions, and the calculation of suburbanization costs using a universal tool (instrument) is impossible due to the lack of consensus among researchers as to the identification of synthetic indicators or an appropriate methodology.

Even though creating universal methods of measuring all the costs of suburbanization is impossible, efforts should be made to further existing knowledge on the negative effects of this phenomenon, in particular financial ones. One barrier that should be taken into account when calculating economic losses is the heterogeneous structure of suburban space. For example, the polycentric suburban development paradigm that prevails in the US may turn out to be more beneficial in economic terms than excessive restrictions on suburbanization. When seeing the above thesis in the context of the spatial condition of Polish suburbs, which are characterized by considerable fragmentation of land parcels or diversity of terrain, one should interpret the financial benefit of the process with a great deal of caution.

The discussion on the impacts of uncontrolled suburbanization should work towards a sustainable model of economic growth of cities and their suburbs taking into account the resources of the endogenous urban and suburban structures. One pitfall that should be avoided in analyses is drawing wrong conclusions on the basis of individual case studies, which tend to take into account the local specificity of the urbanized area under investigation. This creates the risk of repeating the same observations in different areas or in a wider context (e.g., adopting standardized measurement methods on a nationwide scale). However, it should be emphasized that the mere attempt to estimate the negative financial implications of suburbanization processes, often also the non-obvious ones, offers a significant added value (Dawid 2020).

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