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LIVING IN A COMPACT CITY

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Abstract: The article describes the idea of a compact city, due to the needs and capabilities of contemporary Polish cities, with an emphasis on the Silesia region. Special attention has been paid to the possibility of increasing the cities' density and several examples have been shown to present the possibilities of densifying the cities with new housing investments. Also, the article presents the studies that indicate the capacity for the internal development of selected Silesian cities: Katowice and Gliwice. The article ends with the recommendations for cities to become more compact.

Keywords: Compact city, density, residential areas, architecture, urban planning, urban indicators.

JEL codes: R52, R31

Introduction

The term *compact city* was first officially used in 1973 by two American mathematicians: G. Dantzig and Th. L. Saaty in the book entitled *Compact City: Plan for a Liveable Urban Environment*, (Dantzig & Saaty 1973). The mathematicians' study was a criticism of current forms of urbanisation and a description of a system approach to urban programming, which resulted in an idea of a Utopia, of a circular city of the future¹. At the urban programming stage, the authors were guided by two rules: the rule

¹ A city with the diameter of about 8,840 feet (2.7 km), with the terrace system of 8 consecutive peripheral platforms, is supposed to accommodate 250,000 residents. The central circle offers services, industry, entertainment and trade, with a large public park in its centre. The central circle is surrounded by rings of residential areas consisting of houses and apartments complemented with basic services: shops, schools, clinics, playgrounds. The circular city is divided to 32 sectors with radial and circular roads with collision-free crossings at different levels.

of time and the rule of space, according to which space should be used effectively, and development should be planned evenly for long periods. However, the need to concentrate newly developed buildings had been discussed much earlier. In his 1956 essays *Scope of Total Architecture*, Gropius (1956), one of Bauhaus founders, wrote: *The special character of metropolitan housing developments for settling large numbers of working people around a concentrated city core makes for short commuting distances, which implies the use of multi-storey construction to reduce horizontal distances. The single-family house is contradictory to this basic trend of the city. It is the task of the city planner not merely to improve transportation facilities, but rather to reduce the need for them* (Gropius 2014). In her 1961 book entitled *The Death and Life of Great American Cities*, Jacobs (1961) criticised urbanisation trends effective in the middle of the 20th century, associated with dispersing construction development due to so-called American dream and the dream house in the suburbs; since then, her name is associated with the concept of compact city. In the preamble to the 1987 WCED² report *Our common future*, an expression *sustainable development*³ was used, where appeals for compact development form an important part of its operationalisation. The concept of a *compact city* was included in the 1998 British government document identifying strategic objectives of the English housing policy (Planning Policy Guidance on Housing PPG38), as a city characterised by (1) high density of development⁴, whose (2) increase takes place in already developed areas⁵, characterised by (3) multifunctional (4) environmentally-friendly development, and thanks to the effective public transport and reduced distance between respective functions, also (5) reduced use of cars (see also Bradecki & Twardoch 2013; Twardoch 2016). In the same period, urban planner organisations adopt: *the New Charter of Athens*, *the Charter of the New Urbanism* and the concept of *smart growth*, and in the later decades new development concepts emerged, such as *Sustainable Urbanism*, *Green Urbanism* and *Resilient City*; all of them containing appeals to stop sprawling the development.

Compact city has been defined many times and it is possible to distinguish a few repeated assumptions in definitions based on different approaches: (1) a relatively large built area; (2) combining various ways of area use; (3) well-developed system of public transport; as well as (4) high level of availability in terms of services, jobs and public areas (Ogrodnik 2015). We define *compact city* from the point of view of the urban planning structure as **characterised by the most effective area use**, whereas the effect is not understood as the maximum possible number of square metres of functional space, but rather the **product of the largest desired number of residents on the given area and the character of the place**⁶, while maintaining the best possible living conditions. Therefore, compact development will be

² World Commission on Environment and Development at the EU, led by Ms Brundtland.

³ Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

⁴ At least 30 dwellings per hectare for residential areas.

⁵ So-called brownfields, min. 60% in 1997 and 80% in 2009.

⁶ The character of the place shall mean adaptation of the development to the parameters of the existing buildings and incorporation of the new buildings in the existing urban structure by generating the maximum possible number of spatial connections.

defined in an entirely different manner for areas of different nature. Depending on the urbanisation zone, its parameters should be connected with the effectiveness of public transport, the availability of services, and the need to save resources, including land. Compact development is measured mainly by density and intensity of development and the number of apartments per hectare, whereas it is important to apply indicators simultaneously, as their selective application will not give the full image of the structure of development (see Fig. 1).



Fig. 1. Different types of buildings with the same number of dwellings, with different build-up and indicative housing density

Source: (Bradecki & Twardoch 2013).

Due to the need to adjust it to the context, the notion of a *compact city* is thus difficult to clearly parameterise; however, the generally accepted bottom limit for housing development is 30 dwellings per hectare (except for special cases of farmhouse development).

1. Case studies of selected examples of complementary development in Polish cities

When discussing compact housing development, one should keep in mind that complementation of buildings cannot be done at the expense of green areas and public space. Implementations described in this chapter constitute positive examples of urban housing projects under the *compact city* paradigm.

Example 1. 19 dzielnica, Warsaw – use of brownfields

0.31	built area
1.83	housing density
221	number of dwellings per hectare
635	number of apartments

19 dzielnica is an example of use of the previously developed areas (so-called brownfields) for new housing development. As a result of location in the city areas that used to belong to railways, buildings are located very close to the city centre (1.7 km from the Central Railway Station), in the direct proximity to the underground station, bus stops and the suburban train stop (less than 500 m). High development measured by the number of apartments per ha (220 dwellings per hectare) allowed for the complementation of housing development with a broad spectrum of services (over 50). Potential inconveniences relating to such a large

number of apartments were reduced by designing buildings of a diverse height not exceeding 6 storeys, in a square layout. Each miniquarter is organised around the semi-private common space, located on the roofs of underground car parks. The entire complex is complemented with a central square including a sales and services centre in which a restaurant is located. After the completion of the implementation (Fig. 2 presents the first two of the target 4 stages), new buildings will fill the empty space of former railway areas. Due to the system of semi-open miniquarters, after the completion the complex will be easy to incorporate into the structure of the surrounding buildings.



Fig. 2. 19 dzielnica, Warszawa, designed by JEMS Architekci, 2011. Prepared by Julia Swoboda

Source:[<http://urbanmodel.org/pl/atlas-wspolczesnych-zespolow-zabudowy-mieszkaniowej/>].



Fig. 3. 19 dzielnica. Space between quarters with a view to the main square and the Palace of Culture on the horizon. Photo: AT 2013.

Example 2. Gdańsk – complementary quarter development

- 1 built area
- 4 housing density
- 232 number of dwellings per hectare
- 77 number of apartments

The complementary quarter development in the Gdańsk Old Town is in principle a single building based on a two-level car park, whose architectural form imitates medieval forms of the surrounding town houses. The ground floor of the building consists of service outlets and the upper of the two car park levels. An interior courtyard was located on the car park ceiling, on the level +1. Placement of a semi-private space on the level of the second storey reduces the courtyard's resemblance to a well, so that the entire complex could have a cosy and placid character despite being located in the city centre.



Fig. 4. City centre development quarter, Gdańsk, design by Antoni Taraszkiewicz, Piotr Mazur, Wojciech Targowski, P.P.W. "FORT" Sp. z o.o. Prepared by Julia Swoboda [<http://urbanmodel.org/pl/atlas-wspolczesnych-zespolow-zabudowy-mieszkaniaowej/>].

Example 3. Zawisza rezydencje (Lofty) Gliwice – new function of old buildings

0.27	built area
0.79	housing density
51	number of dwellings per hectare
117	number of apartments

Zawisza rezydencje is a service and housing complex located on the area of former barracks, in a perfect location with regard to the city centre. It consists of three facilities adapted for housing purposes (the granary and bakery converted to lofts, and stables converted to terrace houses), as well as new garages, an office building and two planned residential buildings. Adaptation of old buildings for housing purposes allowed for the localisation of apartments in a fantastic place, as well as ensured interesting architecture; however, it hampered the arrangement of the semi-private space within the complex.



Fig. 5. Zawisza rezydencje (lofts), design by Medusa Group. Prepared by AT, TB
 Source: (Bradecki & Twardoch 2013).



Fig. 6. Zawisza Rezydencje, design by Medusa Group 2010, photo: AT.

Example 4. Wieczorka str. Gliwice – infill – filling the gap between buildings

0,51	built area
2,31	housing density
166	number of dwellings per hectare
25	number of apartments

The building fills in the row buildings in the city centre. The building includes 25 apartments and a small retail and service centre on the ground floor. The courtyard is separated with gate, with garages on the ground floor of the annexe. The space behind the gate has basically no green areas, so unfortunately it cannot perform the function of a semi-private space. Lack of green or recreational space, e.g. a playground, is offset by its excellent location close to the city centre, while remaining in the vicinity of a city square with a playground and a park. The building was a project of the municipal company ZBM – TBS, hence the limited costs and car parks on the ground floor instead of in the basement, which would undoubtedly improve the quality of space.

The four examples presented above reflect different methods of planning housing development under the compact city paradigm:

- development of brownfields (former military, railway, industrial areas);
- adaptation of buildings with other purpose;
- filling in the quarters;
- microfilling in the gaps in the development (including superstructures and build-ups).

All four options allow for a regular internal urban development, without building up green areas and public spaces.



Fig. 7. Infill between buildings at ul. Wieczorka, prepared by AT TB (Bradecki & Twardoch 2013)



Fig. 8. Infill between buildings at ul. Wieczorka. Design by Mezzanino, D. Płocica. Photo: TB 2012.

2. Urban potential – examples of Gliwice and Katowice

Adverse urbanisation trends in Polish cities⁷ which we currently experience, *i.e.* uncontrolled sprawl of development to open areas and the depopulation of cities is universally associated with the limited availability of apartments in cities (Mieszkowski & Mills 1993; Stanilov & Sykora 2014). In urban areas there is a notable lack of new apartments, both inexpensive (also due to the structure of the market dominated by private property development) and the high standard ones. This situation is explained by the reduced supply and/or high land prices in the city centre. For this reason *e.g.* the effects of implementation of the government programme in support of the housing industry, MdM (Apartments for the Young) were criticised, *i.e.* mass built-up of suburban areas with cheap property buildings, where apartments were eligible for loan subsidies.

⁷ All cities with powiat status are losing residents apart from Warsaw, and only selected regular powiats attract new residents (*e.g.* Warsaw, Cracow, Wrocław, Poznań powiats). In the longer perspective, by 2050 this trend will only intensify (according to GUS).

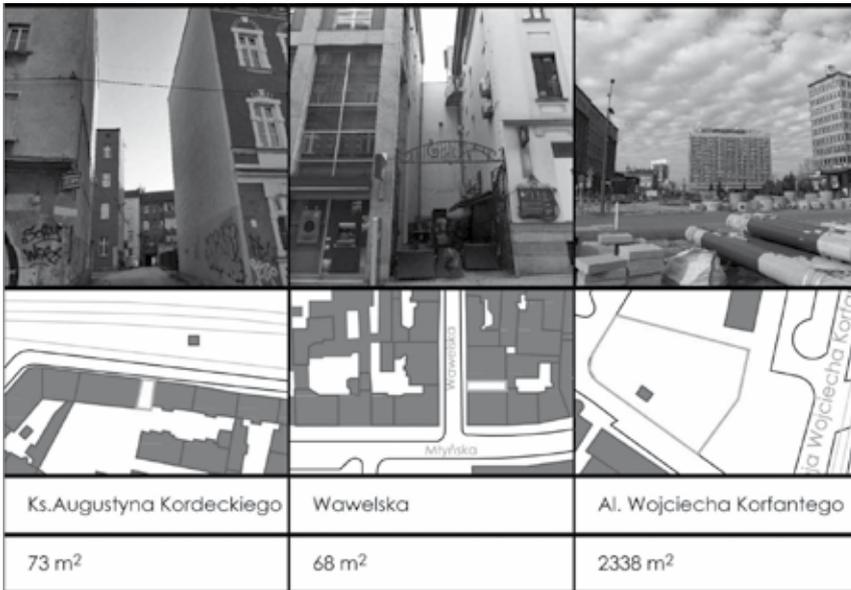


Fig. 9. Examples of gaps between buildings. Visible differences in size and accessibility
 Source: Study: (Sacała 2014) (Fig. 9 and 10).

However, the potential for internal development of cities seems to be underestimated. Under one of Master's theses prepared in the Faculty of Architecture at the Silesian University of Technology, the centre of Katowice was analysed in terms of making the development more compact. On the total area of 116 ha, 81 gaps were identified⁸ between the buildings with the total surface area of 22,259 m², which accounted for almost 5% of the development existing in the analysed area (455,475 m²). Although local spatial development plans did not cover the entire analysed area, on the basis of the guidelines from the study of spatial planning conditions and directions and the parameters of the surrounding buildings it was possible to determine the preferred height of the building for every gap, which allowed for estimation of the total area for potential development, which constituted 91,382 m². After deducting a relevant percentage for internal movement, and after applying the percentage indicators resulting from the study in relation to the number of car parks and the functions, such surface allows for the development of:

- 388 M3 apartments (64.4 m²); and
- 45,327 m² of retail and service space; and
- 841 parking lots.

If buildings of similar parameters were located in the suburban area of Katowice, the area of urbanised area would rise by 10%.

⁸ All gaps were on areas planned for development, and their potential build-up would not affect the reduction of green areas or public space.

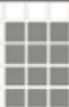
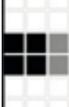
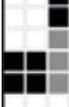
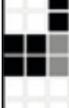
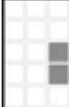
		Gap size	Small	Medium	Large
Gap location/ limitation					
At the end of the built-up area / limited by one wall		2	3		
Between buildings / limited by two walls		24	13		
Between buildings / limited by many walls		5	19	7	
Corner / limited by two walls			3	1	
Unrelated to the built-up area					3

Fig. 10. Classification of gaps between buildings in the centre of Katowice in terms of size and location.

Gaps whose filling may be hampered marked with darker colours

The identified gaps between buildings are characterised by a significant diversity, both in terms of the surface area (23 m² to 23,748 m²) and in terms of accessibility (gaps not limited by walls, limited by one wall, two walls, or gaps of complex structure). Therefore, development of part of them can pose a considerable architectural and structural problem; however, adaptation of even those of them that are the hardest to develop is not impossible. This can be proved by the study designs prepared under the discussed Master's thesis, and numerous projects, including the most radical one, the Keret House⁹ designed by K. Szczęsny, located in Warsaw.

The above calculations are approximated and offer only an estimation of potential effects; however, they do present the significant potential of internal development

⁹ The Keret house was built in 2012 as an artistic installation. A fully functional infill in the gap between prefabricated blocks, consisting of a kitchen, bathroom, bedroom and a place to work, with 152 cm in the widest point; although in accordance with the Polish law it cannot constitute housing premises, is referred to as the narrowest house in the world.

in Katowice. Since even such simplified analysis of the development in Gliwice, in spite of total omission of smaller gaps, reveals a considerable number of possible locations for new buildings in the compact city centre (see Fig. 11, white outlines), supposedly the urban planning structure of other cities in Upper Silesia has a similar internal development potential. Interestingly, in the case of Gliwice, in the last 10 years a great part of housing projects of both municipal companies, ZBM – TBS I and II, was implemented as infills for the city centre buildings (see Fig. 9, black objects), which indicates that the internal development potential is starting to be noticed by local authorities.



Fig. 11. Potential infills in the buildings in the centre of Gliwice. Projects implemented by ZBM – TBS Gliwice in the last 10 years marked with black

Source: [<https://www.google.pl/maps>, elaboration: AT].

As it has been mentioned at the beginning of this chapter, the problem of the availability of apartments also applies to luxury apartments tailored to individual needs and offering facilities similar to those in an archetypal house with a garden. This aspect of the problem of the availability of apartments in the city also seems

possible to be solved, this time in terms of the potential of architectural design. An example can be one of the works of a well-known Silesian architect, R. Konieczny, who in the conceptual model of a town house (see multiVilla, Fig. 10) proposed an outline of the city centre development, which could nevertheless ensure the possibility to individually create the living space and to access private green areas (here in the form of green terraces) comparable to the facilities offered by single-family development.

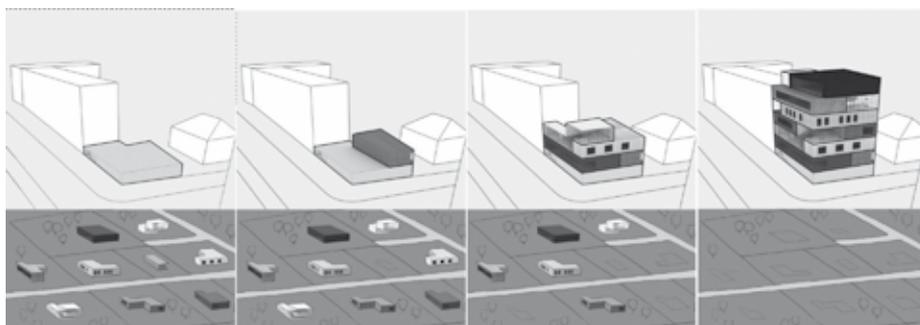


Fig. 12. multiVILLA: idea of creating housing development in the city, concept design, arch. Robert Konieczny KWK Promes.

Source: [<http://www.kwkpromes.pl/multivilla/694>, access: 02.2017, published upon author's consent].

Summary and conclusions

As it has been presented above, it is not true that sprawling the buildings is the only possible direction of the development of modern Polish cities. Considering downward demographic trends, growing technological possibilities (guaranteeing the freedom of construction and organisation of fully-fledged green areas on ceilings), as well as identical levels of air pollution in urban and suburban zones¹⁰, urban sprawl is justified neither by the deficit of available areas inside urbanised zones, nor by the housing conditions in the cities. However, new development is indeed becoming more and more dispersed¹¹.

The actual reasons for the sprawl of buildings in Poland include consumer preferences on the demand side, and on the supply side, local policies of gminas, deficiencies in the regional spatial policy, and the state housing policy (supporting private property buildings, *i.e.* single-family and property development). As in

¹⁰ According to the latest report of the voivodeship Inspectorate for Environmental Protection in Katowice entitled „Stan środowiska w województwie śląskim w 2014 r.” [<http://www.katowice.pios.gov.pl/monitoring/raporty/2014/raport2014.pdf>, access: 02.2017], for urban and rural areas within the whole Śląskie voivodeship the classification of air pollution with carbon monoxide, sulfur dioxide, ozone and benzopyrene is identical.

¹¹ 94.2% of buildings built in 2014 are single-apartment buildings, average number of dwellings in one building is decreasing from 6.35 in the 1970s to 3.05 after 2011 (according to GUS).

the Polish administrative system regional policy cannot be implemented with regard to income tax redistribution, it is in the natural interest of the gminas to attract the largest possible number of new residents (Czerny 2005). Therefore, the demographic absorbency of land, according to the locally adopted location law, much exceeds the development potential of gminas¹², and since the tools limiting the expansion of built-up areas at the regional level, such as *Urban Growth Boundary*¹³ (Nowak 2015), do not exist, new buildings are not constructed gradually, but they are extensively dispersed on a large area. Another reason for development sprawl, both on the supply and on the demand side, is the urban transport policy due to the fact that it is still based on increasing road capacity and ignores the induced demand principle¹⁴. This is connected with the fact that whenever access from a given direction is facilitated towards the core city, suburban zones increase. The state housing policy affects suburbanisation in favour of private property housing (e.g. the MdM programme, construction tax reliefs etc.), in particular by introducing regulations according to which loan subsidies would only apply to apartments from the primary market (currently deleted). Such measures combined with the lack of regulations on the lease market, ensuring safety both for tenants and for lessors, results in a situation where the available sector is flooded by cheaper development apartments, i.e. located in the suburbs, and single-family houses built by economic system, also in suburban areas.

However, the most important factor associated with urban sprawl seems to be consumer preferences and the related ignorance about the effects and costs of uncontrolled urbanisation. These costs are actually very high. According to the report¹⁵ prepared for the Construction Congress and the Foundation for the Development of Local Democracy, estimated commuting costs alone (vehicles and fuel, as well as time lost by commuters) due to development sprawl amount to PLN 36.9 billion per year. The remaining costs that are very difficult to estimate include

¹² Local spatial development plans adopted at the end of 2012 allow for the settlement of 62 m persons, and the demographic absorbency of areas according to the adopted studies of spatial planning conditions and directions exceeds the current number of residents sixfold (229 m vs 38 m) (Nowicki *et al.* 2014).

¹³ *Urban Growth Boundary* (UGB) – intransgressible border of development. The first UGB was the green belt around London created in 1935 in order to stop the urban sprawl. At present UGBs are used e.g. in England, the US, Canada, France or Hong Kong.

¹⁴ Derivative demand is where the rise in supply, and the resulting decrease in prices and increase in product availability cause such increase in demand that offsets the earlier rise in supply. In the case of traffic analyses, a regularity is not taken into account, according to which on average the 10% increase in the number of road lanes causes an immediate 4% growth of the number of travelled kilometres, and within a few years grows so much that it entirely fills the increased road capacity, causing the same problems as the ones we faced earlier, albeit in the large scale (Speck 2012).

¹⁵ *Raport o ekonomicznych stratach i społecznych kosztach niekontrolowanej urbanizacji w Polsce* (Nowicki *et al.* 2014).

gmina expenditure¹⁶, social costs¹⁷, and environmental costs that are impossible to be estimated¹⁸.

Recommendations

In the course of works on a research project aimed at characterising housing development in the cities of the Upper Silesia Metropolis, prepared in years 2000-2010 (Bradecki & Twardoch 2013), authors of the study developed recommendations associated with compact housing development which were completed with general recommendations for the purposes of the study:

1. Applying more accurate guidelines for the density of the designed buildings and mandatory determination of the driving and walking access network in local spatial development plans.

It seems that apart from the maximum parameters of density, local plans should also specify the minimum acceptable values of density and the number of dwellings per hectare. In the concept of New Urbanism¹⁹ associated with the idea of the *compact city*, the notion of a *transect* appears, *i.e.* quantified division of urbanised areas from a city centre to a natural zone (see *rural-to-urban transect*, Duany & Plater-Zyberk 2014). Modification and application of the *Transect* concept to Polish conditions seems justified. Respective stages of urbanisation (development in city centre/downtown buildings/residential districts (not urban commuter towns)/suburbs/small towns and villages/open areas, natural areas (Bradecki *et al.* 2015) should be parameterised and included in the local planning system.

2. Negotiating and approving new building designs: investor – representatives of local authorities – urban planners – residents.

The negotiation system is applied in the local planning in the majority of Western European countries; some of its elements can also be used under the regulations effective in Poland (*e.g.* public-private partnership); however, in order to be most effective, negotiation system might require an increase in social capital, whose

¹⁶ Costs of repurchase of land for roads, development and maintenance of the technical and social infrastructure, loss of the planning fee. For instance, a threefold increase in length of the water supply and sewage system due to modernisation carried out *e.g.* with the use of EU funds resulted in an increase in the number of households connected to the grid by about 1/5.

¹⁷ *E.g.* fading social ties, lack of community life due to the lack of public space and time used for commuting, hampering small enterprises that are unprofitable in the situation of a large urban sprawl, and lack of local centres.

¹⁸ Air pollution with exhaust fumes, low emission connected with heating of single-family buildings, soil and water pollution associated with the insufficient level of plumbing, disappearance of open areas, rural landscapes and environmental corridors and aeration wedges, deterioration of the living conditions due to exceeded local capacity of the environment.

¹⁹ Movement initiated by P. Calthorpe, A. Duany, E. Moule, E. Plater-Zyberk, S. Polyzoides and D. Solomon in order to develop a standard for urban development as an alternative to US model of suburban sprawl. The Charter of the New Urbanism codified in 1996 defined the rules of urban planning at the regional, city and district level and the urban planning rules at the level corresponding to single buildings. Its requirements led to a change of the US urban planning practice and to a general debate about its rules.

current low level hampers the solutions based on confidence (Mularska-Kucharek 2013).

3. Determination of border conditions for the planned development in the form of urban planning standards, handbooks for local authorities.

4. Competitions rather than tenders with the only criterion being the lowest price with regard to local plans.

and, as general recommendations:

5. Education and promotion of knowledge about the benefits of compact cities.

6. Regional spatial development policy.

Certain hopes for the improvement of regional cooperation for Śląskie voivodeship are related to the currently adopted Metropolitan Act (of 9 March 2017 on the metropolis in Śląskie voivodeship); however, the Act alone does not provide sufficient tools; in this respect, it seems necessary to change the tax system to the one allowing for redistribution of the part of the income tax under subregional settlement units (e.g. poviats).

7. Extension of the priorities of the housing policy.

The housing policy which supports community construction²⁰, including grassroots housing industries and the sector of apartments for rent, fosters the internal development of cities. This offers greater flexibility for individual investors, who are building apartments for personal use, than for developers building for profit. Projects complicated in technical and design terms inside the urban structure are usually exposed to higher risk, therefore are not an attractive investment for profit-seeking developers.

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²⁰ Community housing industry is the third, after public housing industry (which satisfies the housing needs in the institutional manner, generating considerable public costs) and property development (which constitutes market goods, and its objective is to generate profit), form of non-individual housing industry, in Polish conditions represented mainly by housing cooperative, community rent and company-owned apartments.

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