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STUDIA MIEJSKIE 37

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DEKLARACJA O WERSJI PIERWOTNEJ
Redakcja deklaruje, że wersją pierwotną (referencyjną) czasopisma jest wersja papierowa.

CONTENTS

SPIS TREŚCI

STUDIA MIEJSKIE
tom 37 (2020)

INTRODUCTION

This new issue of the *Studia Miejskie* journal is now at the disposal of our readers, regardless of the disorganizing impact of the global pandemic on most of the manifestations of human activities, not only those of a creative nature. Already after a glance at the table of contents, it is not difficult to notice that the manuscripts received and accepted by the editorial board fit in well with the current social participative cognitive approach to city studies (including quantitative methods), with a particular emphasis laid on the decisive role of residents, i.e. the vital force of any urban "place".

Consequently, the subject areas of the individual contributions cover a range of issues such as: adaptation of a sociological methodology-derived concept (neighbourhood liveability) to considerations of a spatial nature, or the influence of space syntax on pedestrian route choices, as well as the relationships between theoretical measures of space syntax and actual pedestrian traffic in relation to urban structures. Further on, the reader will also find a reflection on the issue of collective benefit, with activities aimed at integrating communities, which stimulate development of agglomerations. There is the issue of restoring social functions and reducing the alienation of the homeless from the urban environment in a comparative study of two differing in cultural conditions and geography cases, and finally, a look at participatory budgets and their effectiveness in dedicated thematic sections (pro-environmental and as part of counteracting climate threats).

This volume of the *Studia Miejskie*, now at your disposal, does not deal directly with pressing topics related to the current epidemic-related difficulties of our civilization, both due to the nature of the treated issues and the time at which the papers were written. However, it is a source of high-quality research knowledge and inspiration. May it also be a glimpse into the "old" times, as well as a contribution to looking with hope into the future when, perhaps like in the past, research subjects topical at the time will not necessarily have to be linked to viruses.

Jan Zipser

STUDIA MIEJSKIE
tom 37 (2020)

WPROWADZENIE

Nowy numer czasopisma Studia Miejskie, pomimo dezorganizującego wpływu globalnej pandemii na przeważającą część przejawów ludzkich działań – nie tylko twórczych – trafia do rąk czytelników. Nie trudno zauważyć już po wstępnej lekturze spisu treści, że otrzymane przez redakcję teksty dobrze wpisują się w aktualne, społeczno-partycypacyjne podejście poznawcze w badaniu miasta (w tym również przy użyciu metod ilościowych), ze szczególnym oczywiście uwzględnieniem decydującej roli mieszkańców, czyli siły witalnej „miejsca" zurbanizowanego.

W prezentowanym tomie tematyka artykułów dotyka takich zagadnień, jak: adaptacja do przestrzennego charakteru rozważań pojęcia wywodzącego się z metodologii socjologicznej (żywotność osiedli) czy wpływu składni przestrzeni na podejmowane przez pieszych decyzje wyboru trasy, związki występujące pomiędzy teoretycznymi miarami składni przestrzeni a rzeczywistym ruchem pieszym w odniesieniu do struktur miejskich; dalej znajdujemy rozważania nad zagadnieniem kolektywnej korzyści, gdzie działania mające integrować społeczności pobudzają rozwój aglomeracji; wreszcie temat przywracania funkcji społecznych i ograniczenie wyobcowania bezdomnych ze środowiska miejskiego w studium porównawczym dwóch przypadków, różniących się uwarunkowaniami kulturowymi i geografią; na koniec zaś spojrzenie na budżet partycypacyjny w wąskim ujęciu efektywności jego wykorzystania w dedykowanych sekcjach tematycznych (prośrodowiskowych i w ramach przeciwdziałania zagrożeniom klimatycznym).

Przekazywany w Państwa ręce tom Studiów Miejskich nie porusza „palących" tematów związanych z obecnymi trudnościami epidemicznymi naszej cywilizacji (a to z racji podnoszonych zagadnień, a zarazem czasu powstawania artykułów), jest jednak źródłem wysokojakościowej wiedzy badawczej i inspiracji. Niechaj także będzie spojrzeniem w „stare" czasy, ale również przyczynkiem do spoglądania z nadzieją w przyszłość, gdzie być może, tak jak kiedyś, bieżące tematy naukowe nie będą musiały mieć koniecznie związku z wirusami.

Jan Zipser

STUDIA MIEJSKIE
tom 37 (2020)

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THE SPATIAL DIMENSION OF NEIGHBOURHOOD LIVEABILITY. A COMBINED PERSPECTIVE OF LOCAL CUSTOMERS AND SERVICES PROVIDERS

PRZESTRZENNY WYMIAR ŻYWOTNOŚCI OSIEDLA Z PERSPEKTYWY UŻYTKOWNIKÓW I USŁUGODAWCÓW

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ABSTRACT: Neighbourhood liveability is a concept reflecting the perceived living conditions in a housing area. Liveability depends, on the one hand, on the relationship between the demand and the supply on the local services market, and – on the other hand – on the spatial structure of the neighbourhood. In this paper, we combine those two aspects by asking the question: What physical forms are the most effective in providing quality of life and satisfying the everyday needs of citizens? We present the results of a social survey and mapping analysis conducted in 5 neighbourhoods in Poland representing big cities, medium-sized towns and suburbs. Each case study included opinions of both customers and services providers. The results show that there are particular spatial structures (streets, squares, passages) positively evaluated by each of the two groups, determining the neighbourhood liveability.

KEY WORDS: neighbourhood liveability, urban services, perception of space, local service centre

ABSTRAKT: Żywotność osiedla (*neighbourhood liveability*) to pojęcie określające warunki życia w obszarach mieszkaniowych. Żywotność zależy z jednej strony od relacji między popytem i podażą na lokalnym rynku usług, a z drugiej – od struktury przestrzennej osiedla. W prezentowanym artykule łączymy te dwa aspekty zadając pytanie o to, jakie formy przestrzenne są najbardziej efektywne w zapewnianiu jakości życia i zaspokajaniu potrzeb mieszkańców. Przedstawiamy tu badania społeczne i analizy przestrzenne przeprowadzone w pięciu osiedlach reprezentujących różne konteksty osadnicze w Polsce. Każdy przypadek uwzględniał opinie klientów i usługodawców. Wyniki badań pozwalają na wskazanie elementów struktury funkcjonalno-

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-przestrzennej (ulic, placów, pasaży, skwerów etc.) ocenianych pozytywnie przez obie grupy, a tym samym sprzyjających żywotności wybranych osiedli.

SŁOWA KLUCZOWE: żywotność osiedla, usługi miejskie, percepcja przestrzeni, lokalne centrum usługowe

The question of neighbourhood liveability

Neighbourhood liveability refers to the state of living environment, which should offer an acceptable quality of life to the residents. Liveability depends on the perception of local economic, social and cultural conditions by the users (Pandey et al. 2013). Availability, accessibility and affordability of services have a positive relationship with neighbourhood liveability (cf. Lovejoy et al. 2010, Arundel & Ronald 2017) and therefore residents in 'compact-cities', where high density of housing is accompanied with various facilities, appear to be significantly more satisfied with their neighbourhoods compared with residents of sprawled suburbs.

There are several physical aspects of liveability, such as infrastructure, public amenities, quality of environment and land-use pattern. The functional diversity of urban space is necessary for the presence of various people for various purposes, at various times of the day. This diversity means a mix of different functions (workplaces, housing, services, business) located in different buildings, creating a harmonious whole and determining the sociopsychological well-being of the residents (Pandey et al. 2013, Wojnarowska 2017).

The most common measure used in empirical studies to assess liveability within built environments is neighbourhood satisfaction, connected with safety, quietness, neighbour ties, accessibility and attractiveness (see Lovejoy et al. 2010; Mouratidis 2018). Thus, neighbourhood offering an easy access to amenities, to public spaces and public transport has a positive association with liveability.

It may be assumed therefore that liveability depends, on the one hand, on the relationship between the demand and the supply on the local services market, and – on the other hand – on the spatial structure of the neighbourhood. In this paper, we combine those two aspects by asking the question: What physical forms are the most effective in providing quality of life and satisfying the everyday needs of citizens in urbanized neighbourhoods? Are there any common patterns in the spatial distribution of places satisfying the needs of the two groups in various settlement settings? In order to answer these questions we adopt a 3-step research method described below.

The 3-step research method

The proposed three-step interdisciplinary approach included inventory, social research and GIS studies. The desk research and field research was conducted in the years 2017-2019, in 5 locations in Poland representing various geographical settings

(large cities, medium-sized towns and suburban areas – see the details of the research sample below) and comprised the following stages:

1) In the first step, a thorough inventory of selected locations was carried out, including delimitation of research areas (local service centres and their surroundings) and typology of available services and public spaces.

2) In the second step, social surveys (paper and pencil interviews) were conducted among two groups of respondents: customers (users of public spaces) and services providers. The questionnaires included a map on which the respondents marked their preferred places.

3) In the third step, the respondents' answers were geocoded and an in-depth mapping analysis was conducted. The details of the method are presented below.

5 case studies

Services have originally developed as natural concentrations of human activity. A traditional urban neighbourhood typically consisted of a housing estate and a local service centre (LSC) defined as a specific urban structure including multi-function public space and surrounding buildings providing access to local (everyday) services, fostering social integration (Damurski et al. 2019).

Today those natural mechanisms are challenged by new phenomena: digitalisation, metropolisation, suburbanisation and gentrification. This is particularly visible in urban neighbourhoods where 'glocalization' effects occur, reflecting the tension between traditional values and post-modern trends (Walton 2000). Therefore the basic object of the presented research is a neighbourhood with its local service centre.

In this paper, we focus on 5 local service centres located in Poland. The research sample has been carefully selected in order to represent various settlement contexts, starting with large cities (Warsaw, Wrocław), through medium-sized towns (Ostrów Wielkopolski) down to suburban areas (Siechnice, Zabierzów). It is neither random nor representative in statistical terms, but offers a good insight into different locations and appeals to B. Flyvbjerg's idea of 'phronetic research' which means that the researched problems are not only academic (theoretical), but are considered real problems by the rest of society and that the results will feed back the political, administrative, and social environment (Flyvbjerg 1998).

When studying neighbourhoods, the boundaries of the research area can be determined on the basis of administrative, statistical, spatial or social criteria (cf. Ohmer et al. 2019). The choice of criteria depends on the research objective and organisational capabilities of the research team (i.e. feasibility of the research). In practice, researchers usually rely on figures related to the intensity and use, transport mobility and the economic value of the site and facilities. However, these methods are quantitative in nature, and thus omit the issue of qualitative diversity of phenomena. Following the suggestion of A. Wojnarowska (2017), qualitative methods such as cartographic studies, literature review, participatory observation, analysis of places with cultural functions,

identification of areas with a significant share of pedestrian traffic, etc., should be used to determine the LSC's boundaries.

In the presented paper, the frame that defines the spatial range of local service centres are the streets and pedestrian routes from the central node (which cumulates most activities) to characteristic service points such as a shop, library, or church. In order to maintain comparability of the LSC in different contexts, the principle has been adopted that only buildings and areas with a service function (e.g. a shop located on the ground floor of a residential building or a school with a sports field), public spaces (unfenced and accessible around the clock) and semi-public spaces (fenced but accessible for most of the day) are included within the research area. Thus, the boundaries set in this way do not take into account buildings with a purely residential function, as this would create significant delimitation dilemmas and undermine the comparability of individual cases.

The first local service centre is located in Ochota district in Warsaw (area: ca 11 hectares). It is a street market in Mołdawska Street with long-lasting traditions, located in a mixed neighbourhood (some 50-year old blocks of flats and some apartments dating from the last 10 years). The second location is Pereca Square in Wrocław (area: ca 12 hectares) with a well-established LSC in a typically urban pre-war neighbourhood offering a variety of services (including a discount supermarket, schools, post office, pharmacy, café, bank, library, church). The third example is a well-established cluster of various services in a 40-year-old blocks of flats neighbourhood situated around Waryńskiego, Śmigielskiego and Paderewskiego streets in Ostrów Wielkopolski (area: ca 12 hectares). The fourth case study is the newly-built (2014-2017) Market Square in Siechnice, with the municipality office situated in the central part, surrounded by blocks of flats with some services on the ground floor (area: ca 5 hectares). The last example

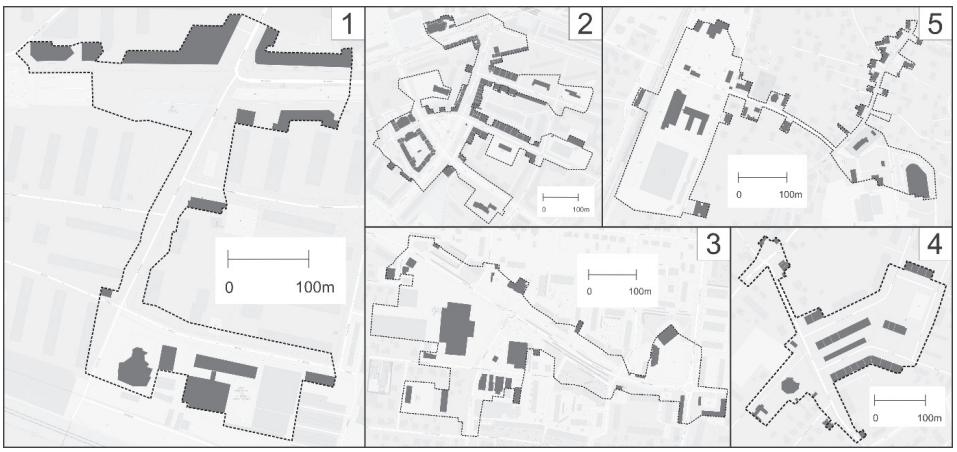

Fig. 1. Local service centres selected for the study: (1) Mołdawska Street in Warsaw, (2) Pereca Square in Wrocław, (3) Waryńskiego, Śmigielskiego and Paderewskiego streets in Ostrów Wielkopolski, (4) Rynek in Siechnice, (5) Kolejowa and Krakowska streets in Zabierzów

Source: authors' own research. Sources of background maps: https://www.openstreetmap.org.

is also the newly-built (2014-2018) market square in Zabierzów (area: ca 11 hectares) with a municipality office building (Fig. 1).

Step 1: Inventory

The first task was to define the range of each local service centre within its neighbourhood. LSC borders were drawn by the buildings with services on the ground floor, including public spaces between them (streets, squares, pathways, greenery areas). They did not include merely residential buildings. Thus, the range of the LSC was delimited by streets and pedestrian pathways leading to the centre, starting with characteristic amenities (such as a school, library, church or park).

Step 2: Social survey

In the second step, paper and pencil interviews (PAPI) were conducted among two groups of adult respondents: users of public spaces and services providers. The questionnaire comprised 12 main questions covering various aspects of neighbourhood environment plus 5 'metrics' questions (age, sex, etc.). The last question included a map on which the respondents marked their preferred places: the customers pointed the places where they felt good and the services providers pointed the places where locating a business is the most effective.

The questionnaires were distributed in each LSC by students of the Wrocław University of Science and Technology in selected public spaces and residential areas. The distribution was systematically organised: it was conducted in the spring-summer season, on selected weekdays (usually Wednesday and Sunday), at various daytimes (9:00-12:00 and 16:00-19:00). This approach provided necessary standardisation of research and enabled capturing the variety of local population in its daily routines as well as the condition of the local services market.

Table 1

Number of questionnaires filled in particular locations

Local service centre		Number of respondents			
Location	Name	Users		Services providers	
		Number	%	Number	%
Large cities	Warsaw: Mołdawska Street	161	26.1	43	24.6
	Wrocław: Pereca Square	159	25.7	58	33.1
Medium-sized towns	Ostrów Wielkopolski: Waryńskiego Street and surroundings	135	21.8	28	16.0
Suburban areas	Siechnice: Market Square	73	11.8	16	9.1
	Zabierzów: Kolejowa Street and surroundings	90	14.6	30	17.1
Total		618	100.0	175	100.0

Source: authors' own research.

A total of 793 filled-in questionnaires was collected (618 from public space users and 175 from services providers – cf. Table 1). The numbers of respondents varied significantly in particular LSCs, which was a result of their settlement contexts (large cities / medium-sized town / suburban areas). This research sample is not representative in statistical terms, which means that the results cannot be generalized for the whole population. However, it is reliable in methodological aspects and allows building some general remarks on neighbourhood liveability characteristics.

Step 3: Geocoding, processing and visualizing

The results of the social survey conducted have been geocoded as points with particular geographical coordinates. This database served as a basis for the maps of attractiveness of public spaces from the point of view of the customers and of the services providers in the 5 case study areas.

Graphic visualization of the results was conducted using the GIS application by adopting a distance-dependent density estimation tool (*Kernel shape*). This method enables a non-parametric surface smoothing of the distribution of respondents' answers (Silverman 1986) by establishing the core of density based on the following relationship:

$$\tilde{\int} K(x,y) = \frac{1}{n}\sum_{i=1}^{n} K_h(t_i) K_h(s_i)$$

where:

n – random variable

K_h – kernel ratio

h – smoothing parameter

The research adopted quartic/biweight function, for which the kernel equation takes the following form:

$$K_h(t_i) = \begin{cases} \frac{15}{16}\frac{1-t_i^2}{h} & \text{if } t_i < 1 \\ 0 & \text{if } t_i \geq 1 \end{cases}$$

The sizes of the computing cells (X, Y) were implemented as 5 m and 10 m, and the distance radius as 50 m. The size of the cell is a result of averaged public distance (Hall 1997: 157-158) and the range of analysed local service centres. The radius of coverage was adjusted to 5 m areas, whereas for the visualisation of resulting parameters it was raised without major loses to 10 m due to the program computational capability. The parameters were standardized for each of the locations, which enables to make reliable comparisons despite significant differences in the number of respondents.

Following geocoding, a second GIS analysis was conducted in order to link the answers of the customers and of services providers. A reclassification procedure

was used to transform raster files into geodata polygon files (shape). Then the areas pointed by users (d_{use}) were merged with the areas pointed by services providers (d_{ser}) (GIS function: *Union*) and those preferred by both groups were extracted (GIS function: *Intersect*). As a result, a convergence ratio (*CR*) was counted using the following equation:

$$CR = \frac{d_{int}}{d_{uni}}$$

where $d_{uni} = d_{ser} + d_{use}$ (Union)

and $d_{int} = d_{ser} \cdot d_{use}$ (Intersection)

Research results

Geocoding of answers allowed making visualisation of customers' and services providers' preferences regarding public spaces in particular local service centres. The resulting maps show the spatial distribution of respective public spaces in each neighbourhood (Fig. 2). They also demonstrate significant differences in the approach of each of the stiudied groups: concentration of positive answers given by the users may be interpreted as "places of local community", where particular emotional attitudes are located (Agnew 1987). On the contrary, spatial preferences

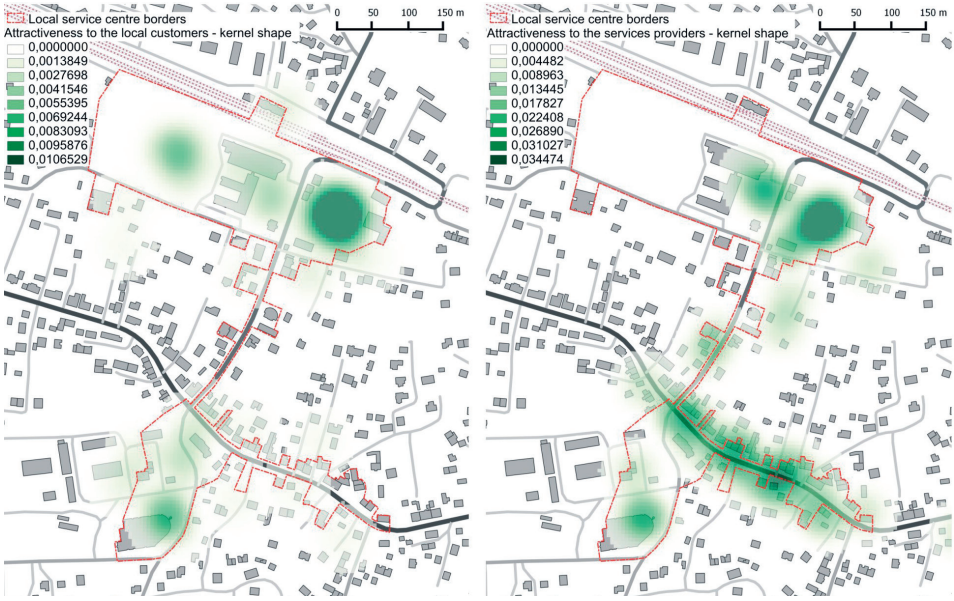

Fig. 2. Sample visualisation of answers offered by customers (left) and services providers (right) in Zabierzów local service centre

Source: authors' own research.

of services providers are based on economic characteristics, such as catchment area and market capacity land value. In theory, the two groups should meet in one place in order enable a comfortable exchange and to satisfy their needs. In practice, the picture of attractiveness of local service centres is much more complex: most customers prefer public places and squares, whereas most services providers point to streets and passages (Fig. 3).

Spatial preferences of services providers are characterized by two features. First, there is a visible tendency to choose areas where customers' paths cross: main crossroads and streets with high traffic volumes are the most attractive places (LSC in Zabierzów and in Ostrów Wlkp.). This feature is connected with parking spaces – for example, in LSC in Wroclaw services are located mainly in Pereca Square, where places for cars are provided, not in Grabiszyńska Street, where the highest traffic load is observed. Such a car-transport dependence of services was also proved in other research (cf. Mayer-Wydra 2019).

Fig. 3. Examples of spaces attractive to customers (left) and services providers (right) in Zabierzów local service centre

Source: authors' own resources and research.

The other factor crucial for services providers is the existence of other amenities, especially those with long traditions. New shops and cafes are preferably located near the previously built ones, which is supposed to raise the number of potential clients. For example, in the LSC in Warsaw, the street market has become a reference point for many other areas indicated by the services providers.

The results for customers (surveyed users of public spaces) showed that neighbourhood attractiveness may be connected with a general notion of spatial order and aesthetics. The mostly preferred areas are greenery (a park near the LSC in Warsaw, playground in the LSC in Wroclaw) and public squares (LSCs in Siechnice and Zabierzów). Each of those places has been quite recently refurbished and probably this "newness" is the main reason for such preferences. Paradoxically, in the areas selected by customers, there is a relatively low number of services – it seems that average users of public spaces prefer quiet and relaxing zones rather than busy concentrations of services.

Despite the differences described above, there are several commonalities in the perception of space by users and by services providers. In each local service centre, there are at least two concentrations of positive answers, the dispersion of areas preferred by both groups is relatively high. Moreover, it is hard to prove any regularity in location of particular zones, except one: only open public spaces, equipped with greenery, clear pathways for pedestrians and surrounded by buildings with services on the ground floor were commonly pointed to by both groups. This observation proves the indispensable role of traditional LSC forms for neighbourhood liveability (Fig. 4).

Juxtaposition of the quantified spatial preferences of customers and services providers reveals relatively low levels of convergence in each local service centre: the CR values reach from 0.14 to 0.21 (Table 2). The preferences of customers and of services providers are significantly different, in particular in Zabierzów case study.

Table 2

Convergence between customers' and services providers' answers regarding the attractiveness of neighbourhood public spaces

Local service centre		Areas preferred by		Convergence ratio *CR*
Location	Name	Either users or services providers d_{uni} [m^2]	Both users and services providers d_{uni} [m^2]	
Large cities	Warsaw: Mołdawska Street	89,922.42	16,200.00	0.18
	Wrocław: Pereca Square	39,952.12	8,526.92	0.21
Medium-sized towns	Ostrów Wielkopolski: Waryńskiego Street and surroundings	88,870.37	17,982.90	0.20
Suburban areas	Siechnice: Market Square	21,105.21	3,775.17	0.18
	Zabierzów: Kolejowa Street and surroundings	41,227.19	5,883.28	0.14

Source: authors' own research.

Fig. 4. Areas positively evaluated by customers and services providers. Example of Zabierzów local service centre

Source: authors' own resources and research.

Conclusions

Among contemporary decision-makers there is a common desire to support cities in improving their attractiveness, liveability and economic competitiveness (JPI 2015). In this paper, we tried to address this challenge by juxtaposing the perspectives of users and services providers in 5 selected neighbourhoods in Poland in order to answer the question: What physical forms are the most effective in providing quality of life and satisfying the everyday needs of citizens in urbanized neighbourhoods?

The research results presented in this paper are of a limited range and cannot be generalized for all the urbanized neighbourhoods. However, they show some tendencies in the spatial distribution of neighbourhood liveability. The most important findings can be summarized in the following points:

1) Local service centres in selected neighbourhoods are differently evaluated by the users and services providers. Each of those groups has its own preferences regarding the attractiveness of public spaces, reflecting their different needs and expectations. The customers point to mostly public places and squares (especially those including green areas), whilst the services providers commonly indicate streets and passages with high numbers of pedestrians passing by.

2) Despite the differences described in Point 1), there are some areas where the preferences of customers and services providers meet and overlap. The convergence zones are those where overall attractiveness is accumulated. However, the values of CR (convergence ratio) are relatively low and surprisingly similar in all the analysed locations. This observation shows how hard it is to create spaces satisfying both customers and services providers, regardless of the settlement context (large city / medium-sized city / suburban area).

3) The biggest concentrations of convergence zones have been observed in open public spaces, equipped with greenery, clear pathways for pedestrians and surrounded by buildings with services on the ground floor. It proves how fundamental the role that traditional forms of local service centres play in their neighbourhoods is – they are the most effective spatial structures for providing satisfaction for both customers and services providers and thus conditioning neighbourhood liveability.

4) This study is another proof of the aptness of Gehl's (2009) postulates: it is better to concentrate than to disperse activities, it is better to attract various groups of users than to divide them. The contribution of this paper to the current studies in the field is focused on geocoding and quantifying the preferences of customers and services providers in various settlement contexts, showing some universal regularities in perception of neighbourhood spaces despite their different backgrounds, structures and functions.

5) The presented method of visualising the attractiveness of local service centres by customers and services providers seems to be a useful and reliable tool for evaluating the physical dimesion of neighbourhood liveability. However, further research is needed to verify its utility in other spatial contexts and other groups of users.

Acknowledgements

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PEDESTRIAN MOVEMENT AND SPACE SYNTAX MEASURES. THE EXAMPLE OF THE CITY CENTRE IN ŁÓDŹ, POLAND

RUCH PIESZY I SKŁADNIA PRZESTRZENI. PRZYKŁAD CENTRUM ŁODZI

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ABSTRACT: In accordance with the assumptions of space syntax, spatial configuration shapes spatial patterns of pedestrian traffic. The influence of configuration (spatial relations) on, for instance, pedestrian route choice causes further consequences, making an impact on the land use pattern or providing opportunities to form social relations. The identification of the configurational features of space may, therefore, play a crucial role in the processes of urban planning and renewal. The goal of the study is to verify the assumed relations between the theoretical measures of space syntax and the actual pedestrian traffic. The study proves that theoretical indices are strongly connected to the real pedestrian traffic intensity. This fact confirms the value of space syntax methodology in the studies on the relations between society and the built environment.

KEY WORDS: space syntax, pedestrian movement, built environment, street network, agency of space

ABSTRAKT: W myśl założeń teorii składni przestrzeni, konfiguracja przestrzeni kształtuje przestrzenne wzorce ruchu pieszego. Wpływ konfiguracji (przestrzennych relacji) np. na decyzje o wyborze trasy przemieszczania się, rodzi dalsze konsekwencje takie jak obciążenie ciągów komunikacyjnych, możliwość nawiązywania relacji społecznych lub sposób użytkowania ziemi. Rozpoznanie konfiguracyjnych cech przestrzeni może zatem ogrywać istotną rolę w procesie planowania lub reorganizacji i odnowy struktur miejskich. Celem prezentowanych badań była weryfikacja zakładanych związków pomiędzy teoretycznymi miarami składni przestrzeni, a rzeczywistym ruchem pieszym. Wykazano, że wskaźniki teoretyczne pozostają w silnym związku z realnym natężeniem ruchu pieszego. Potwierdza to wartość metod składni przestrzeni w badaniach relacji pomiędzy społeczeństwem i środowiskiem zbudowanym.

SŁOWA KLUCZOWE: składnia przestrzeni, ruch pieszy, środowisko zbudowane, sieć uliczna, sprawczość przestrzeni

Introduction. Research goal

A city space devoid of meanings and functions assigned to it by society is a purely relational structure, conditioned by the existence of material objects. However, even

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such space actively influences its users. This happens because acting in accordance with certain geometric rules is as natural for humans as is the ability to speak. To paraphrase Alfred Gell, the author of one of the first concepts of the agency of things (1998), space is characterised by agency, that is the ability to initiate causal occurrences in the vicinity of an agent. In the relation described herein, man, an intentional being, is the primary agent, while the relational structure of space is a secondary agent, always functioning as an extension of man's will.

From the social perspective, dividing and re-merging space gives it new values and functions necessary to its users (Godelier 2012). Thus, the places of encounters, co-presence and co-awareness are created (Peponis and Wineman 2002). In reality, regulating space amounts to regulating the relations between people (Hillier and Hanson 1984). Actions such as sleeping, eating, working, resting, participating in social meetings, and shopping are performed in various places that can be linked to form predictable relations (Leach 2010). In this way the social logic of space is shaped (Hillier and Hanson 1984).

Space syntax is one of the research currents where the agency of space, understood as a relation between spaces that make up a given structure, is the main research subject. This theory has been developed since the 1970s by Bill Hillier and his colleagues at The Bartlett, University College London, and it makes it possible to assess the influence of a specific spatial configuration on the functioning of societies. In the space syntax theory, the proportion of urban pedestrian movement determined by the urban grid configuration is known as the natural movement. Pedestrian movement is also influenced by attractors – buildings or urban features having the potential of generating the trips to and from those built forms. Yet, it is configuration that "is the primary generator, and without understanding it we cannot understand either urban pedestrian movement, or the distribution of attractors or indeed the morphology of the urban grid itself" (Hillier et al. 1993: 32).

Research on space syntax indicates that the spatial patterns of human activities are largely shaped by spatial configuration (Hillier et al. 1993; Sharmin and Kamruzzaman 2018; Turner and Penn 2002). It has been shown that the topology of a street network plays a unique role in explaining people's collective behaviours. It is still being proven that studies conducted in the field of space syntax are able to predict people's collective activities (Ma et al. 2018). Therefore, space syntax is believed to make it possible to assess urban space and single out places with varying levels of social activities (and, therefore, with varying consequences). The assessment is possible not only *ex post,* but also *ex ante*, i.e. before the agency of a designed spatial structure (e.g. urban layout) begins. Space syntax studies also contribute to the research on spatial accessibility, understood as the relative ease by which the locations of activities can be reached from a given location (Luo and Wang 2003: 865). The way of spatial configuration can be considered a special case of accessibility (Ståhle et al. 2005). In this theory, accessibility and distance are associated with junctions (points), instead of the usual streets (lines) (Batty 2004).

The achievements of space syntax are crucial in studies on socio-economic processes related to the presence of people in urban space, such as spatial patterns of criminal behaviours, search for an optimal location of retail and service facilities, optimisation of city traffic, etc. (Kim and Sohn 2002; Lerman and Omer 2013; Ozbil, Peponis and Stone 2011; Penn et al. 1998; Van Nes and López 2010).

In Poland, studies utilising the achievements of space syntax are relatively rare. The authors base their work on theoretical assumptions, without making attempts to verify them on the basis of real behaviours of societies in Polish cities (Kocki and Kwiatkowski 2016; Książkiewicz 2015; Nassery and Dudek 2015; Saeid and Masztalski 2009).

The purpose of the research presented in the article is to assess the correlation between the real intensity of pedestrian traffic within a city space and the theoretical measures developed in the field of space syntax. The results of field observations refer to selected configurational indices calculated on the basis of three various models of urban space, developed in accordance with the premises of space syntax. It is, possibly, one of the first, if not the first, Polish attempt to confirm the selected data developed in the field of space syntax.

The long-term purpose of the presented verification of the assumptions of space syntax is to develop the theoretical bases for research on the diversification of socio-economic processes in the context of agency of urban structures.

Models of urban space[1]

The model of urban space is the basis for the analyses conducted as part of space syntax. So far, several methods of constructing such a model have been developed. Their purpose is to transform a two-dimensional plan (of a city, a district, etc.) into a graph which would make it possible to conduct a quantitative analysis as the next step. Depending on the method adopted, a model is constructed from the so-called axial lines, natural streets or new axial lines.

Each model is made of lines representing spaces that enable pedestrian traffic in the analysed structure. During line construction it is usually assumed that a pedestrian walks along pedestrian routes (avenues, boulevards, pavements). It is also assumed that a line represents the whole of the space seen by the pedestrian, therefore one line is constructed per street, instead of two lines representing two pedestrian traffic routes on both sides of the street.

The model made up of axial lines is the oldest. The lines are straight, usually drawn by hand in such a way so as to cover all spaces of the analysed structure. The least numerous set of the longest axial lines that meets this assumption is called an axial map. An axial line symbolises a space in which pedestrian traffic may occur, but it is also a sight

[1] The presented reflections regard solely the research on pedestrian traffic on the urban scale and the selected methods of space syntax based on axial lines.

line (Hillier and Hanson 1984). Moving along this theoretical line, a pedestrian can see the space it represents. However, the field of vision and the movement possibilities not always go hand in hand, for instance, due to the presence of ground-level barriers. Therefore, it is reasonable to verify the model in the field.

The growing access to databases with vector cartographic data, such as Open Street Map, resulted in a new method of building a city model. The fact that building a traditional axial map is really time-consuming and researchers may struggle to remain objective during its construction is also not without significance. The new model was based on street axes (central lines of streets), commonly used on vector maps. Segments of such axes (that is the sections from one intersection to another) are automatically combined into routes. These, in the context of human perceptive mechanisms, are convenient traffic routes known as natural streets (Jiang, Zhao and Yin 2008). They are formed from segments that fit best in terms of angles and, in contrast to the axial lines, are usually curved. This concept is based on the principle of good continuity known from the achievements of Gestalt psychology.

The third of the mentioned models is constructed on the basis of natural streets. Those can be treated as a hint to draw a set of straight axial lines (Liu and Jiang 2012). To differentiate, the resulting lines are known as new axial lines. The process of constructing them has been automated. Similarly, it is also possible to automatically create axial lines in the first model mentioned.

Each of the enumerated models allows building a dual graph that illustrates the topological structure of the space of the researched layout. In this graph the spaces (e.g. streets) are represented by vertices, and their connections (e.g. intersections) by the edges of the graph (Fig. 1). A graph makes it possible to obtain a number of rational data about each space that makes up a given structure. The data is objective, which means it depends on the city plan and not on the researcher or, for example, the respondent users of space (or, the individual cognitive or motor capabilities, etc.). Each space (vertex of the graph) is analysed in the context of the configuration of the whole layout or the neighbourhood adopted for the research (e.g. covering the area within three topological steps).

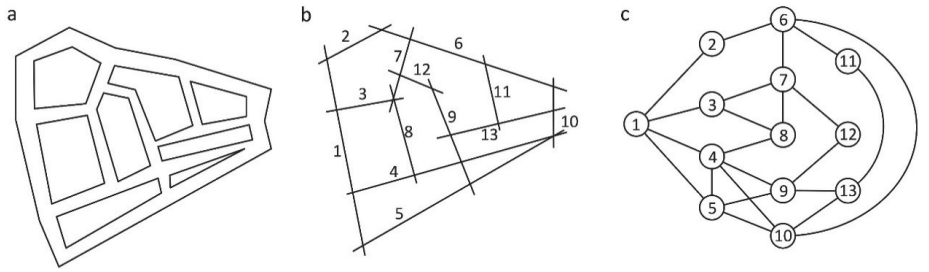

Fig. 1. Transformation of a city plan into a graph: a – fictional urban layout, b – axial map, c – connectivity graph

Source: Jiang and Claramunt 2002.

The perception of spaces that make up a given urban structure from a configurational angle (i.e. taking into account the relations between each space and all others) is typical of space syntax. It is emphasised that even a small, local change in structure (e.g. closing off a street) has global consequences, since it changes the configuration of the whole layout. Therefore, the level of attractiveness of a place is determined not only by the local context (e.g. the quality of its development), but also the overall configurational context. Configuration is of fundamental significance, since it constitutes a somewhat hard-to-modify framework of social and economic life. Relatively permanent physical objects modify the behaviours of societies in space and create relations that impose upon them a given set of available spatial choices. The method of structure configuration determines, among other aspects, the peripherality or centrality of individual places. In this way, configuration influences numerous social and economic activities, for instance locations of social gatherings or service facilities. Therefore, it is crucial to identify the predispositions of a given spatial structure in order to optimise the use of places that compose it, not only in terms of the requirements and needs of their users, but also from the angle of the nature of the layout itself.

The course of the research

The research was conducted at two stages. The first stage involved the preparation of three graphic models of the research area, enabling a quantitative analysis. The research area in question was the centre of Łódź, within the borders of the Historic Urban Core, together with a 400-metre-wide zone surrounding it (more than 2200 ha in total).

The axial map was made manually, on the basis of the city plan. The map of natural streets was automatically generated on the basis of the central lines in the Georeference Database of Topographic Objects created by the Regional Surveying and Cartographic Documentation Centre in Łódź. The map of new axial lines was generated automatically on the basis of natural streets. Some new axial lines, representing long, winding, natural streets, required manual corrections. Then, selected configurational measures were calculated on the basis of models. The AutoCAD Civil 3D (2020), DepthmapX (2017), ArcMap (ESRI 2015), and Axwoman (Jiang 2015) software was used for this purpose.

Field observations were conducted at the second stage to record the actual presence of pedestrians. Observations were preceded by marking out street segments (from one intersection to another) in such a way as to include a set of real streets – representatives of a whole set in terms of integration, one of the key measures of space syntax (illustrated in Fig. 2 using the example of natural streets).

At the same time, the aspiration was for the segments observed to form closed loops long enough to make it possible to conduct cyclical observations. As a result, 165 street segments were studied, making up approximately 60-70 axial lines/natural streets/new axial lines (Fig. 3).

The method of conducting observations was based on similar research conducted in London (Hillier et al. 1993). The studies were conducted on a working day and with the

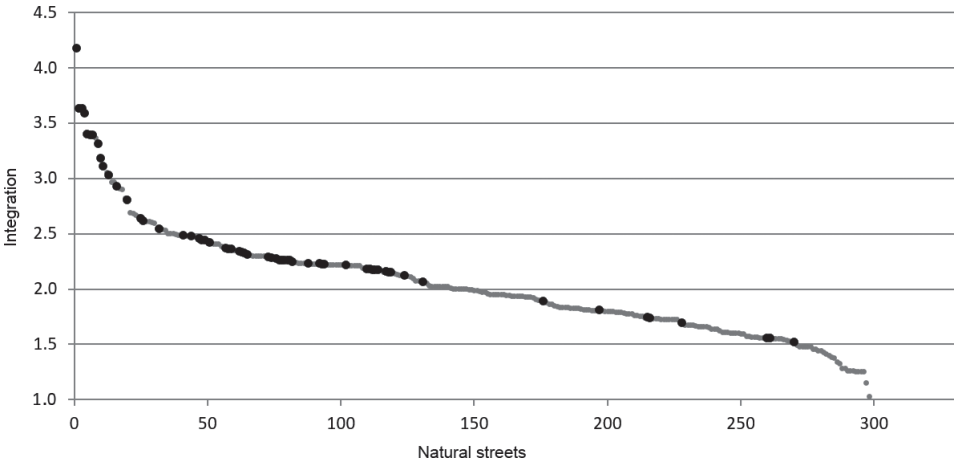

Fig. 2. Arrangement of the values of the global integration of natural streets in the centre of Łódź. The grey dots stand for values of all natural streets, the black dots stand for streets whose segments were under observation. Streets with the lowest integration values are under-represented in the observations. It is the result of conducting observations outside of the zone surrounding the Historic Urban Core to limit the so-called edge effect

Source: author's own elaboration.

participation of 60 observers[2] recording pedestrian traffic along selected routes (Fig. 3). The observers moved at the speed of approximately 5.5 km/h, along six routes, each one approximately 5.5 km-long, in such a way as to observe the studied route again after an hour. The observation was conducted between 8 a.m. and 6 p.m.

During the process, they recorded passers-by, noted down their gender, approximate age (child, adult, senior) and behaviour (in motion/motionless – e.g. waiting for the arrival of public transportation). They also recorded the observed traffic intensity,[3] i.e. the number of people observed per 100 m of the segment, correlated with selected configurational measures.

Selected configurational measures and the actual pedestrian traffic

Among many measures used in the field of space syntax, four were subjected to correlation analysis: total depth, global integration, local integration, and control value. Defining the notions of symmetry and depth is necessary to understand these measures.

A symmetric relation of two spaces, for example A and B, occurs when the relation of A to B is the same as the relation of B to A and their relations to other spaces in the

[2] The observers were students of spatial economy, Faculty of Geographical Sciences at the University of Łódź.

[3] When calculating traffic intensity, children under the care of adults were omitted, since it was assumed that their routes were most likely chosen by their guardians.

Fig. 3. Observation routes against the street network in the centre of Łódź. Roman numerals stand for the numbers of subsequent routes (as in Table 1). The dash-dotted line marks the area of the Historic Urban Core of Łódź, the dotted line marks the 400-metre-wide zone surrounding it
Source: author's own elaboration.

layout are also the same, for instance A to C and B to C (Fig. 4a). When paths from A to C and from B to C differ (Fig. 4b), the relation is asymmetric.

Depth expresses a topological distance between spaces. For instance, it takes one topological step to cross from space A to space B, and two steps to cross from space A to C (Fig. 4b). Therefore, it can be said that in the layout in question, space B is the most shallow, because the distance between it and the remaining spaces in the layout is the shortest. This affects the whole system. Closing off space B would prevent the system from functioning, while the results of closing off A or C would be less negative.

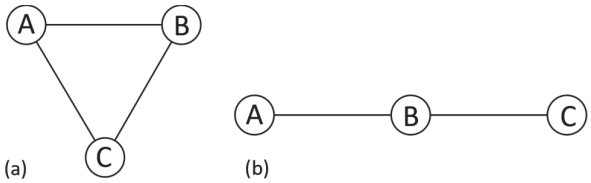

Fig. 4. Symmetric and asymmetric relations between spaces
Source: elaboration on the basis of Hillier and Hanson 1988.

Total depth is a global measure dependent on the size of the whole system. It shows how deep each space is in the analysed structure. Its value determines the number of topological steps to be taken from a given space to reach all other spaces. Therefore, for example, due to transit costs, it is better to choose shallow spaces throughout the whole layout, since they are closer to all others, over spaces that are deeply rooted in the system. It should be emphasised that the notion of topological distance is not synonymous to metric distance. For instance, spaces with high depth values may be located both on the outskirts and in the centre of the analysed structure.

The results of field observations show a statistically important, reverse correlation between the total depth values calculated for the studied spaces in the centre of Łódź and the real traffic intensity (Table 1). That means that traffic intensity is higher on streets that are topologically shallower, while streets with a larger depth have lower pedestrian intensity Therefore, this facet of the configuration of urban structures not only illustrates their inner, topological diversity, but also influences the presence of users in space.

Table 1

Values of correlation* between the selected topological measures of space syntax and the intensity of pedestrian traffic in the centre of Łódź

Model**	Total Depth	Global Integration	Local Integration (R2)***	Control value	P-value
Axial lines	–0.5885	0.6664	0.6132	0.6025	$p < 0.001$
Natural streets	–0.6178	0.7240	0.6635	0.6433	$p < 0.001$
New axial lines	–0.6174	0.6884	0.6466	0.6012	$p < 0.001$

* Pearson's linear correlation coefficient.

** Each time, without five observations that drastically upset the result of the correlation of global integration. Those were, for example, spaces with high integration values observed along extremely short route segments where a relatively low traffic intensity was observed or streets with low integration values located in the vicinity of busy trade squares.

*** Calculated for the neighbouring area within two topological steps.

Source: author's own elaboration.

The comparison between the real depth of the system seen from a given space and its depth or theoretical shallowness (the lowest when all spaces are direct neighbours

of a given space, as in Fig. 1a, and the highest when all spaces form a linear sequence starting with the space in question, as is the case with space A in Fig. 1b) makes it possible to calculate relative asymmetry. The calculation of relative asymmetry of a given space is based on the mean depth of the system from the perspective of the analysed space and related to the number of spaces that make up the whole system (2). This leads to a normalisation of depth to fit values within the range [0, 1] (Al Sayed et al. 2014).

$$MD_i \text{ (Mean Depth)} = \frac{D_i}{n-1} \tag{1}$$

$$RA_i \text{ (Relative Asymmetry)} = \frac{2\left(MD_i - 1\right)}{n-2} \tag{2}$$

where:

D_i (Total Depth) $= \sum_{j=1}^{n-1} d_{ij}$,

n – number of vertices in a graph (a space in the analysed layout),
d – topological step,
i – analysed space (vertex in a graph).

To calculate a normalised value of RA (3), it needs to be divided by D_{value} (4). This makes it possible to calculate global integration (5) or local integration (in a given neighbourhood of spaces and defined by a number of topological steps):

$$RRA_i \text{ (Real Relative Asymmetry)} = \frac{RA_i}{D_{value}} \tag{3}$$

$$D_{value} = \frac{2\left\{n\left[\log_2\left(\frac{n+2}{3}\right)-1\right]+1\right\}}{(n-1)(n-2)} \tag{4}$$

$$INT_i = \frac{1}{RRA_i} \tag{5}$$

Spaces that integrate the studied system show high integration values, while spaces segregated from the system show low integration values. Integration is a global measure, since it considers the relations between space and every other space in the system (Hillier and Hanson 1988). It should be emphasised that integration is considered a crucial measure of space syntax, as it helps understand the relations between the users of space and space itself. The existence of significant relationships between the integration value and the presence of pedestrians in space was proven on multiple occasions. It is believed that the integration value also corresponds to the indices of social interaction and trade activity (Hillier 1996). As a result, integration is often considered a measure of the quality of urban space, additionally providing information about the potential of a given space.

The results of observations confirm a high positive correlation between the integration value and pedestrian traffic. The correlation is slightly higher with global integration than with the local one, but it always approaches or exceeds the level of 0.7, which proves the existence of a significant relation (coexistence) of the analysed features.

The correlation is proven by the scatter plots prepared for each analysed model (Fig. 5). Each time, the R^2 coefficient informs that the observed intensity of pedestrian traffic is determined in 45-50% by the level of integration of the street network. Therefore, the configuration of street space in the centre of Łódź can be considered an important determinant of pedestrian traffic within the city space.

The diagrams also depict the special position of Piotrkowska Street (rightmost point). The street has both the highest integration value and the lowest depth in the studied structure. It also has the highest control level (described further on). This space is the centre of the Historic Urban Core not only topologically, but also functionally, representationally and symbolically. In its considerable, an almost 2-kilometre-long section, where vehicle traffic is highly restricted and pedestrians have right of way. It is also space with intense trade and service activity; maintaining its centrality in the city is part of the policy of Łódź authorities.

It should be mentioned that out of both calculated integration measures, global integration is slightly better correlated. This may result from the features of observation areas and the traits of its users. City centres have a higher percentage of destinations with a significant range of influence (specialised functions within the city range or beyond). Still, the major percentage of people using these services come from outside the city centre. Possibly, these people (including tourists) create different spatial movement patterns (in comparison with those created by the residents of the city centre). The diversity may stem from the readiness to cross longer distances on foot (searching for the way, aiming to reach multiple destinations en route, sightseeing).

The control measure is, on the other hand, a local measure, based on relations between space and immediately neighbouring spaces. Control value measures the degree to which a given space controls access to the immediately neighbouring spaces (6) (Osman and Suliman 1994).

$$C_{Value} = \sum_{C(i,j)=1} \frac{1}{Val(i)} \tag{6}$$

where:
$C(a,b)$ – the connectivity between the immediately neighbouring graph vertices i and j,
$Val(i)$ – the number of direct connections for vertex (i).

If k stands for the number of immediate neighbours of a given space, then each neighbour has a control 'strength' of $1/k$. The total value of $1/k$ for each space determines the strength of its control. Spaces with the total value exceeding 1 have strong control, while those with the value lower than 1 have weak control (Fig. 6).

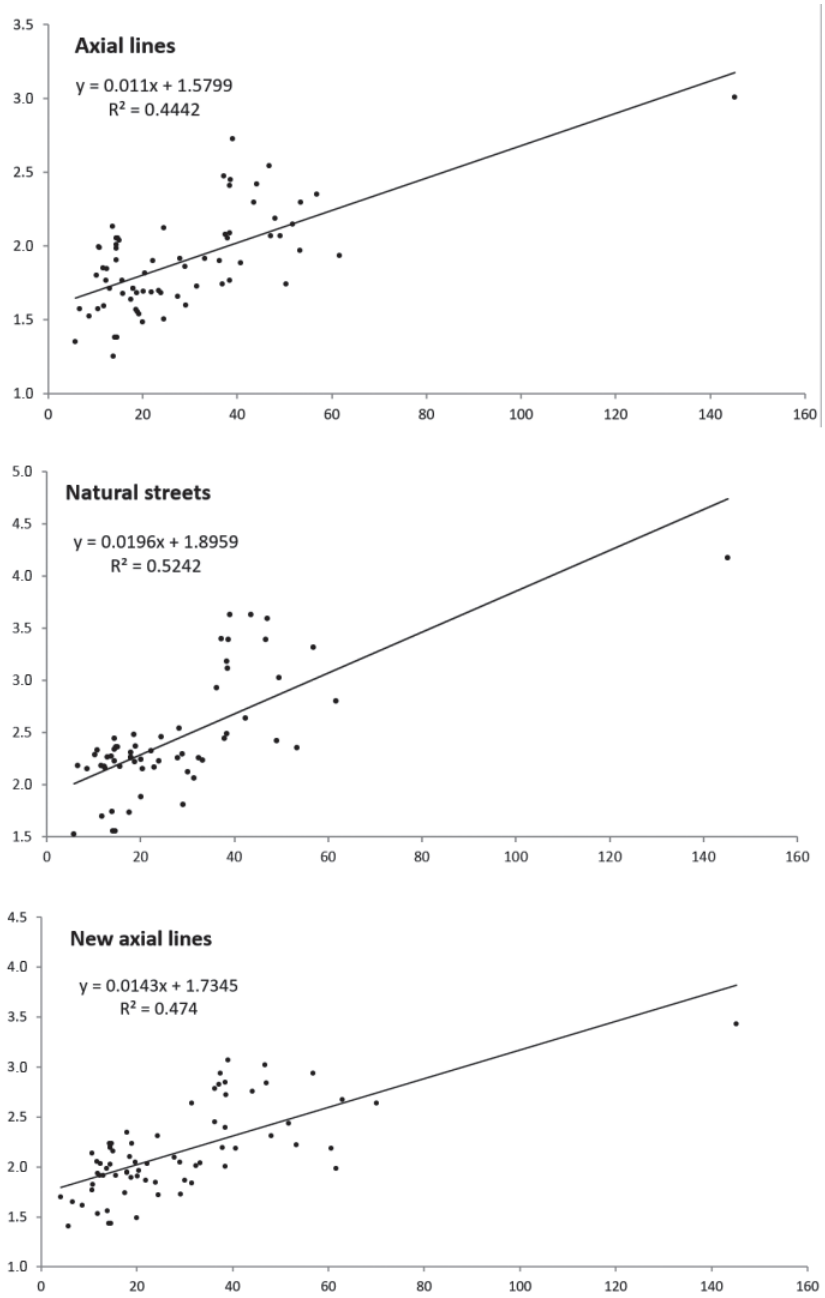

Fig. 5. Relation between the intensity of pedestrian traffic (persons per 100 m) (horizontal axis) and the integration value (vertical axis) in the studied models

Source: author's own elaboration.

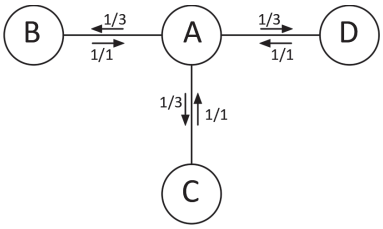

Fig. 6. Method of calculating control values. Space A is the only neighbour of spaces A, B and C, therefore it fully controls access to them. It 'receives' 1/*k*, that is 1/1, from each of them. Access to space A depends equally on the passability of three spaces B, C, and D, therefore each one has the value of 1/3. Thus the control values for spaces in this layout are A = 3, B = 0.33, C = 0.33, D = 0.33

Source: author's own elaboration.

Also in this case field observations showed the existence of a significant positive correlation between the intensity of pedestrian traffic and the level of control. In each analysed model the correlation value either reaches or exceeds 0.6.

The same parameters, total depth, global integration, local integration and control value, were calculated separately for each of the six routes observed (Table 2). The results yet again confirmed a high correlation between the theoretical measures and the actual intensity of pedestrian traffic, although with local exceptions to the observed regularities.

Observations conducted at routes II-V indicate a stronger correlation of the observed features; the results for route VI are close to the average values; observations conducted at route I, encompassing the Old Town area, have a higher divergence from the theoretical model.

Table 2

Values of correlation between the intensity of pedestrian traffic and the selected configuration measures, in accordance with observation routes

Model	Total Depth	Global Integration	Local Integration (R^2)	Control
I				
Axial lines	–0.3528	0.2981	0.5339	0.5195
Natural streets	–0.5843	0.4897	0.5700	0.3553
New axial lines	–0.4484	0.3805	0.4796	0.5180
II				
Axial lines	–0.6774	0.7857	0.6884	0.7312
Natural streets	–0.6220	0.7831	0.6410	0.8358
New axial lines	–0.7034	0.8242	0.6878	0.7751

Table 2 contd.

Model	Total Depth	Global Integration	Local Integration (R^2)	Control
III				
Axial lines	–0.7270	0.8055	0.6935	0.8495
Natural streets	–0.7807	0.8696	0.8003	0.8353
New axial lines	–0.7737	0.8621	0.8020	0.9111
IV				
Axial lines	–0.6050	0.7508	0.6007	0.7226
Natural streets	–0.6732	0.8267	0.6754	0.9388
New axial lines	–0.5497	0.6778	0.5639	0.7525
V				
Axial lines	–0.7915	0.8790	0.7209	0.8159
Natural streets	–0.7156	0.7818	0.6759	0.6336
New axial lines	–0.7151	0.7784	0.7185	0.7632
VI				
Axial lines	–0.5826	0.6714	0.5187	0.6129
Natural streets	–0.5710	0.6537	0.5359	0.5758
New axial lines	–0.5684	0.6392	0.5113	0.5838

Source: personal elaboration.

A detailed data analysis has shown that several streets with higher than predicted pedestrian traffic intensity are responsible for the low correlation visible in the last case. These were, among others, parts of Lutomierska and Bazarowa streets, near the busy Zachodnia Street as well as streets in the vicinity of the Bałucki Market. It is possible that the divergence between the observations and the model was caused by local movement 'generators' in the form of concentration of sources and destinations (accumulation of public transport stops, shopping centres, etc.). This would also validate the high intensity of pedestrian traffic on Piotrkowska Street, which is significantly higher than on other streets of Łódź with similar global integration values (Fig. 6).

Discussion

The goal of the research is to assess the accuracy of theoretical space syntax measures in predicting the intensity of pedestrian traffic in urban space. These measures were calculated on the basis of three models used in the field of space syntax and representing real spatial structures. It is necessary to point out that both the measures calculated on the basis of presented models and the models themselves are based solely on the topological properties of spatial structures.

The prediction capabilities of the models are applicable to mass behaviours, not individuals. Additionally, it cannot be assumed that a spatial configuration model will fully match pedestrian traffic, since models omit elements such as the nature of building development and its intensity, the presence of traffic sources or destination points. There is also a certain simplification to the spatial behaviours – for instance, it is assumed that people take the shortest paths possible. The characteristics of societies are also omitted (e.g. age or lifestyle which have an effect on the tendency to walk).

The research results indicate that all analysed models similarly evaluate the structure of urban space. Generally, the conformity of each model to the observed pedestrian traffic is both quite high and statistically significant (Table 1). In each of the analysed parameters, the model based on natural streets has the highest conformity, yet the divergence of the levels of correlation between the models is small. The analysis of partial observations (by routes) indicates a similar, strong or even very strong correlation between the calculated measures and the real intensity of pedestrian traffic. In this case, it is hard to assess which model has the highest conformity. The best correlations usually occur in the model based on axial lines and natural streets. Therefore, the predictive properties of models are similar, and the choice between them may depend more on the researcher's preferences or software availability than their properties.

The analysis of individual routes has shown significant differences on the level of correlation between theoretical measures and empirical observations on the local scale. However, for most routes, the correlations obtained were high or very high, exceeding the correlation calculated for all routes in total.

It should be emphasised that observations were frequently conducted in relatively short street segments and later generalised to match the whole length of the theoretical lines representing them. Therefore, the observations did not fully consider the possible changeability of traffic throughout the whole length of the analysed spaces. Moreover, the observations were short (one working day), which could influence the level of conformity of a model to the actual situation in downtown Łódź. Yet, the conducted analysis has doubtlessly shown strong and statistically significant relations between the actual pedestrian traffic intensity in Łódź and the theoretical measures developed in the field of space syntax. Therefore, it is possible to assume that conclusions drawn on the basis of theoretical measures of space syntax are reflected in the real socio-economic processes (structures of cities and societies that use them).

Without a doubt, the locations of attractors that influence pedestrian movement patterns should be considered in the analyses. They can have a major influence on the basic pattern established by configuration, which has been confirmed by prior research (Hillier et al. 1993). Although the distribution of attractors is related to the configuration of space, the relation is not straightforward. For instance, various types of economic activities occur in places with characteristic centrality levels (Porta et al., 2010). Yet it is a notion that requires further, separate research.

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COLLECTIVE BENEFITS AS AN IMPULSE FOR URBAN DEVELOPMENT[1]

KORZYŚCI KOLEKTYWNE JAKO IMPULS DLA ROZWOJU MIAST

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ABSTRACT: The development of modern cities is subject to many influences. They include social and cultural inspirations, whose impact results from the local will to adopt new trends, such as the currently popular demands of the postmodern world. Among other things, they promote initiatives intended to integrate urban communities. Cooperation between inhabitants results in the development of urban communities and creation of urban common goods, offering specific types of benefits, such as collective benefits. The purpose of this article is to define and establish the concept of collective benefits substantively among the achievements of urban economy. It has to be stressed that economic relationships which arise in the processes of integrating city users deserve special attention, because the relationships connecting them contribute to the development of unique conditions for living and conducting business. They can be regarded as a broadly understood set of agglomeration economies.

KEY WORDS: common goods, economy for the common good, collective benefits

ABSTRAKT: Rozwój współczesnych miast podlega wielu oddziaływaniom. Wśród nich są inspiracje społeczno-kulturowe, których wpływ wynika z lokalnej woli adaptowania nowych trendów, takich jak popularne dziś postulaty świata ponowoczesnego. Promują one między innym inicjatywy zmierzające do integrowania społeczności miejskich. Skutkiem współpracy mieszkańców jest powstawanie miejskich wspólnot i tworzenie miejskich dóbr wspólnych, oferujących szczególnego rodzaju korzyści, do jakich można zaliczyć korzyści kolektywne. Celem artykułu jest zdefiniowanie i ulokowanie merytoryczne pojęcia korzyści kolektywnych w dorobku ekonomii miejskiej. Zależności ekonomiczne, jakie powstają w procesach integracji użytkowników miast, zasługują bowiem na szczególną uwagę, gdyż łączące ich relacje sprzyjają powstawaniu wyjątkowych warunków zamieszkania i prowadzenia działalności gospodarczych. Można je zaliczyć do szeroko rozumianego zbioru korzyści aglomeracji.

SŁOWA KLUCZOWE: dobra wspólne, ekonomia dóbr wspólnych, korzyści kolektywne

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Introduction

Urban development is a complex process, oriented towards recognition of the positive impact of various factors on the direction of changes in the urban reality. It uses the potential of these factors for inducing transformations, such as motivating to better adapt to the constantly arising new needs of urban area users. Inspiration can be drawn from behaviours of many different people, technological novelties, political events, as well as social, economic, cultural events, etc. The set of development inspirations is infinite: the strength of their impact and effects is impossible to predict. The improvement of city's operating conditions, which is crucial for its development, may even be the result of a decision enforced due to the behaviour of external entities or occurrence of risks. All inspirations are connected by their causal link with the elements of urban reality, which can be noticed and used by the local development leaders. It is their susceptibility to influences that affects the direction and rate of changes. The decision-makers, in turn, are driven by potential benefits, not necessarily financial, but always to an extent corresponding to the demand of one of the city user groups.

These benefits include collective benefits, which arise in connection with the activity of communities in the city area. The purpose of the article is to define and establish the concept of collective benefits substantively among the achievements of urban economy. The economic relationships that arise in different processes of integrating city users deserve special attention, because the relationships connecting them promote the development of unique conditions for living and conducting business. They can be classified among a broadly understood set of agglomeration economies (the term "agglomeration" originates from the Latin word *agglomerare*, meaning "to gather"), which constitute a type of benefits drawn from the concentration of a significant group of people, economic units and institutions within a small urban space. The direct reason why this type of benefits occurs is the proximity of multiple operating entities, including the activity of communities that are established by city users.

Impulses for urban development

Changes are an integral part of how every entity is operated. They result from the discontinuity of operating conditions, whereas the determination of change directions is the main element of any forecasting and planning processes. The high number of actors and plurality of modern impacts results in countless relationships, which makes it necessary to monitor behaviours on an ongoing basis. Z. Bauman wrote about "liquid modernity", concluding that the postmodern world is characterised by a constant transformation, including its modernising tendency, in line with the belief that every "new thing" is better than the previous one, as well as promotion of the highest possible rate of changes designed to search for opportunities to satisfy one's needs better (Bauman 2000, 2004). This is because the context of consumption is nowadays the most important justification for changes, which are designed to expand the offer and

improve the form of consumption. Opportunities to gain new pleasures, which many people regard as their goal in life, are constantly sought. All city users are satisfied when they are able to participate in the consumption which they desire (Czornik 2012). The more such consumption takes into account changes in the city's operating conditions (including the proper recognition and appreciation of development impulses), the more valuable it is.

The set of impulses of this kind is very extensive and depends not only on objective urban features, such as city surface, population,[2] population density, number of business entities and institutions, but also on the assessment of local utility of an impulse. Many authors have paid attention to the increasing inspirational impact of various groups of endogenic factors, emphasizing the significance of decentralisation and technological innovations (Gorzelak 2000), authority of power (Tuziak 2016) and historical heritage (Kulawiak 2016). Other important factors include external influences, related to transfer of EU funds, state subsidies or construction of translocal infrastructure, as well as the results of attracting investors (Gorzelak 2000), cultural import (Hryniewicz 2000) and assumptions of central spatial plans (The Role and Scope of Spatial Planning 2006). Taylor and Stöhr (1981, 9) conclude that the ultimate meaning of development is manifested in personal values, conditioned by social reality. This is due to the fact that none of the impulses has a universal application at any time or in any city. Time, geographic reality, social and economic conditions, as well as external context, is decisive regarding the power of influence. An impulse is important when it is considered to be motoric. This happens when it may cause important changes in the reality of city operation, sometimes without causing any positive transformations. A set of impulses may include influences which degrade the importance of city's resources, and decrease its competitive position or settlement attractiveness. The direction for impulse use is usually decided by the development leaders, but there are also impulses imposed on urban reality, such as natural phenomena, wars and political conflicts, social events (e.g. revolutions, protests, social and cultural trends) and economic events (e.g. crises, collapse of big companies, inventions and new technologies). Their impact may be very significant and not necessarily perceived negatively in the long run. In the history of cities, there have been situations when a city destroyed during an earthquake (e.g. Lisbon in 1755 or San Francisco in 1906) was rebuilt with more modern, antiseismic development and more impressive buildings. The destructive significance of military conflicts is indisputable (e.g. Warsaw, Wrocław, Dresden), although certain cities earned a lot of money thanks to production of weapons (e.g. cities in The Ruhr Region). Social changes contributed to the collapse of many cities, or their complete transformation (e.g. the Roman Empire cities did not survive the liquidation of slavery), although they may also constitute a valuable inspiration, especially when they

[2] The conclusion of OECD report (2015) was that with every doubling of an urban population, the city productivity increases by 2-5%, mainly as a result of competition, better adaptation to labour market needs and exchange of knowledge.

introduce a new civilisation order, which is not necessarily enthusiastically welcomed by the citizens (e.g. Haussmann's renovation of Paris in 1852-1870). The impact of the modernist view of social housing (e.g. Le Corbusier, Athens Charter) cannot be underestimated here, as it significantly contributed to building new social relationships and improving the living conditions of the lowest social classes. The ideologically inspired Polish socialist realism in the construction of cities (Nowa Huta, Tychy) is also less criticised nowadays; particularly, its importance for introducing solutions to ensure the clarity of urban layouts is emphasized (Lipok-Bierwiaczonek 2011). Postmodernity is an impulse for cities to stress the importance of public spaces, or to develop neighbourhood communities. This proved to be useful in mitigating the effects of economic crisis in 2008 that changed the reality of the real estate market, which contributed to depopulation and depletion of income in many cities.[3] The impulses resulting from application of new devices promoted in smart city concepts and used in systems for communication, safety maintenance, obtaining energy efficiency in passive buildings or forms of Internet sales, have been changing the organisation and styles of modern city management as well (Kuźnik, Baron 2017).

Cities also develop based on decisions inspired by the needs reported by the inhabitants and other user groups. The demand for urban products is an important development impulse, which brings sense to the economic activities undertaken in urban areas. This allows for profitable use of both own resources and environmental factors, including the spatial vicinity of rural areas and regional reality. Cities also draw energy from the legacy of the previous generations of their own residents, who contributed to creating a positive image of the place and developing its settlement and investment attractiveness. They sometimes left valuable spatial development elements that are crucial for the current possibilities to intensify the use of urban spaces. The dynamics of changes in all urban features is favourable for the constant maintenance of desired competitive positions, frequently becoming a development impulse for larger territorial structures that they are part of.

Communities and common goods in cities

Cities are municipalities which, according to the law, constitute self-government communities formed by their inhabitants (Act on Commune Self-Government of 1990, Article 1). The existence of a community is decisive for the rules of municipality territory management and use of resources, including the creation of public goods. The duties of a municipality result from the division of competences between specific public authority levels, but do not constitute a complete range of goods and services desired by the inhabitants, who consequently supplement it with their own initiatives.

[3] The Great Recession, which began in the USA in 2008, contributed to deterioration of the social and economic position of 49 out of 50 American metropolises, the only exception being Oklahoma City (Arias, Gascon, Rapach 2016).

Their activity is most frequently manifested by cooperation between people who are interested in transforming a particular area into a place regarded as a familiar space to meet individual and family needs in the best possible manner. The inhabitants make collective efforts to adapt the urban reality outside the formal actions of self-government authorities to the preferences of smaller groups, thus shaping together the actual settlement attractiveness of places in the city, which further translates into the local identity, increased interest in the local aspects of urban policy (aesthetic qualities, services) and even prices of real estates.

The existence of communities is one of the governing principles of social life and is related to the sense of unity of all their members (Millon-Delsol 1995, 7). The goals of integration may be very different, but the people who form communities are aware that belonging to a group enables them to satisfy the needs which an individual is unable to address due to the limited physical capabilities and time constraints, resulting from the lack of talents, limitations of perception, mental and manual capacities, etc. Collective action may also provide an opportunity to establish human relationships and benefit from their results. Belonging to a group has always been important for the living conditions. In the past, it enabled people to survive, mainly thanks to the cooperation between them in obtaining food, protection, care and reproductive partners (Olster 2020, 57-58). Presently, it is rather an opportunity to satisfy higher needs by creating favourable conditions for living in an area that goes beyond one's own property, ensuring the pleasure of sharing interests and opinions, or confirming the social position.

Communities provide unique possibilities to produce and consume, which are easier to notice and use in the urban reality. This is because due to the concentration of people, buildings, activities, etc., various types of human relationships are constantly established. The durability of many communities is low, or even limited to the implementation of a single goal, but for many people cooperation is beneficial in order to use the results of collective actions. M. Maffesoli writes about the modern times that "we are currently reliving, in all fields, *passion for communities*" (2008, 14), which is the result of searching for the possibility to complete the market offer obtained through individual consumption. In cities, more than in rural areas which have active local communities that enable individuals to participate in a group, people live with the sense of a lack of common everyday human relationships. Therefore, they are increasingly willing to take part in social initiatives that are aimed at cooperation. They are frequently encouraged to get involved by common neighbourhood, similar family situations, shared ideals, political views, etc. Taking part in a community is a declaration of voluntary participation in initiatives that form the activity potential oriented towards creating common good that unites all group members, in line with the group goals. Collective success, which is the production of common good, is conditioned upon the individual involvement of a single person, which must have the positive balance of strength expenditure and benefits. It is necessary to notice benefits in order to cooperate, however, such benefits do not have to be material. The important thing is that they are valuable, complementing the product range in the market; that they are one's own products and public goods.

Common goods are not a category reserved for manufacturing or using human relationships by any single group; neither are they a territorial concept. They can be developed either in the city or in the country, having regional, domestic, or even global context. They are created wherever communities are established, being "networks of interrelated human relationships, coloured with emotional elements and certain type of obligations towards the shared values, standards, meanings, history and identity" (Etzioni in: Gawkowska 2004, 567). Urban collective goods are a result of special conditions for integration, which are created by urban areas. The origins of communities that create them lie in the geographic, social and cultural reality of cities, as well as political decisions concerning development and function of a specific fragment of urban space. By creating communities, people most frequently respond to the deficiencies in the desired attractiveness of housing conditions. They want to complement the offer of municipal authorities, developers or property administrators through their initiatives. The specific nature of urban common goods results from the urban lifestyle and nature of business activities conducted in urban areas (Iaione 2016). It is not a condition of existence for city inhabitants to participate in using a common natural resource whose usage they have to agree upon and which they have to take care of for their own good (Ostrom 2013). Their needs in respect of creating common good concern the joint use of municipal resources in the conditions of competing for space. Urban communities focus on satisfying the needs of a small group, which constitutes the type of a subgroup in a larger community, i.e. city users. Everyone has the right to use urban public goods, but many city dwellers also increasingly want to participate in deciding about the detailed features of their use (Polko 2015). Common goods as results of the operation of communities, i.e. groups of people connected with an idea, goals, views, etc., are an expression of their beliefs. Urban common goods are created thanks to the collective efforts of groups who live the urban lifestyle and get involved in the changes inspired by concepts that are characteristic of them. The most frequent among them are neighbourhood communities originating around a commonly used public space, which associates a small number of people who are willing to integrate in order to improve the conditions of using such a space (Błaszczyk 2007, 156), which is a typically urban behaviour in tight spaces of housing estates.

Definition of collective benefits

A lot has been written about collectiveness in recent years. There are many papers on collective actions (e.g. Olson 1971; Coaffee and Healey 2003; Simpson and Aksoy 2017), collective rights (e.g. Harvey 2012; Cities for All 2010) and collective relations (e.g. Vazquez and Gonzalez 2016; Klekotko 2018). However, the subject of collective benefits that constitute an example of economic approach to the problems of community, is not frequently covered. This term was used 11 times in the paper by E. Ostrom (1990), mainly with reference to considerations regarding the *free-rider problem*. We can also refer to the papers by S.M. Foster (2011) quoting R.H. Nelson (1999), collec-

tive benefits are mentioned by Z. Łapniewska (2015, 3) who quotes M. Olson, as well as by M. Sokołowicz (2017), who does not refer to them directly, but considers collective consumption of goods in cities with reference to G. Hardin (1968). The use of collective benefits in management processes is referred to by J. Walter, Ch. Lechner, F.W. Kellermanns (2007).

Cooperation between community members has its fundamental justification in the will of the individual to participate in consumption of a desired good or service that they cannot obtain on their own. However, cooperation may also provide unique benefits related to the existence of community and relationship between its members, i.e. collective benefits. They arise as a supplement to the main "benefits", resulting from the goals of community establishment, but they are not a by-product of the activity of community members, because everyone (or at least the majority of members) joins the community with the aim to participate in obtaining such benefits. Collective benefits are a result of both satisfying needs through common goods and participating in the process of their production. They are the advantage of cooperation and acquired rights of cooperation under community activities. Such benefits provide the sense of belonging to a group and satisfaction from taking part in the act of production.

Collective benefits result from the existence of a community (collective) and are consumed by an individual who, in the majority of cases, is a part of this community. They are distinguished by their creation conditions rather than the consumer or pattern of consumption (except for certain special cases). They result from the existence of bonds (based both on goals and emotions), which are only established in a group and result from involving a part of individual resources (features, possibilities, potentials) in the creation of a specific good, whereby there are usually no formal means of exerting pressure on the individual to add their resources (the "free rider problem"). Collective benefits are a specific result of synergy of individual behaviours, regarded as desired from the perspective of the individual's participation in the social life. Thus, they can be the purpose of cooperation for implementing such intentions that cannot be achieved through the efforts of a single person. At present, however, they mainly seem to be an alternative for satisfying higher needs, related to personal development, social activity or prestige.

Their occurrence is not only justified by economic aspects. They contain sociological elements to a various degree (but always), thus becoming a category that is possible to define and analyse using techniques and methods applied in many fields of social sciences. The urban context of collective benefits is additionally valuable in the reality of urban lifestyle, because there are almost no local communities in urban areas, in the traditional meaning of this form of territorial integration. Nowadays, city inhabitants associate not because of existential necessity, as described by E. Ostrom, but due to the need to participate in human relationships, which supplement the omnipresent postmodern individualism. Collective benefits are increasingly sought as a form of cohabitation. Cities, due to the fact that they are specific concentrations of people, institutions and activities, provide agglomerations with multiple benefits. Relation-

ships between entities are constantly established in city areas and become the basis for their attractiveness, both from the settlement and economic perspective. Urban development leaders desire a good position in the city market, because it provides the voters whom they represent with opportunities for dozens of everyday and occasional contacts. Participation in the exchange between city users, which is a consequence of their presence in the city, is practically invaluable in the age of increased significance of information. All types of agglomeration economies, in the classic division into scale, localisation and mainly urbanisation, result from the gathering of individuals. In turn, their cooperation favours the establishment of communities oriented towards production of common goods and the resulting collective benefits. In comparison with other territorial units, this process runs most effectively in cities.

Elements of collective benefits

The term "collective benefits" requires a detailed analysis in order to be unambiguously defined. However, it is not possible to determine precisely its elements due to the presence of subjective components, which express the recipient's satisfaction level. This is due to the fact that all types of benefits are, by definition, referred to the quality assessment of the processes of satisfying needs, which are expressed by consumers who ultimately evaluate the entire process of addressing the identified deficiencies. There are many types of needs distinguished, and consequently, hundreds of benefit groups arising when such needs are satisfied. The never-ending sequence of necessities, requirements, demands, preferences and appetites justifies all operations, including commercial and social activities. Even volunteering brings benefits which are not financial, but for many activists more valuable, because they satisfy the needs which are not properly addressed in the market relations. This is also the case of collective benefits.

Their main elements, obtained by a community member, refer both to the way in which collective benefits produced thanks to the community activity are generated, and to the consumption of common goods, which contain an element of collectiveness within their range. These include:

1. **Individual benefits**, which are positive effects of satisfying needs, i.e. the result of delivering individual consumption, which is a subjective category measured with individually experienced state of deficiency. Their existence results from the summary of attributes of good (its constituent resources, raw materials, types and amounts of work, ways of obtaining, manufacturing, etc.) with the desired effects of its use. They are partly inspired by the existential needs and, as such, they are suitable for objectification as part of segmentation determined by criteria such as gender, age, health condition, type of work, place of residence, etc. In the field of satisfying higher needs, we cannot precisely classify them into groups, but only suggest classifications of benefits resulting from satisfying similar needs, e.g. regarding education, leisure activities, culinary tastes, artistic preferences, etc. They are always desired, to the greatest extent as egoistic aspiration to derive pleasure from consumption.

2. **Private benefits** resulting from participation of the individual in a community, mainly non-material, constitute a type of individual satisfaction from belonging to a group. Not so much do they result from the use of common goods, as from having the right to being the part of a community. They are private, which refers to the type of ownership, but not necessarily to the individual (separate) use. Their occurrence is, to a significant extent, a result of the existence of primarily biological motivation to being associated in social groups. It is also closely related to the reality of human coexistence and, as such, it has its psychological justification. We want to live among people and each of us needs them (as a group, without individual references). Reclusive lifestyle is regarded as a kind of exception from standard human relationships which involve everyday cooperation in carrying out necessary actions, as well as the pleasure of exchanging information and direct physical contact. In large communities, private benefits contribute to winning recognition, privilege and honour of being included in a group, or reinforcing one's social position, which is of great significance in the political reality of a city. Under operating conditions of smaller and less spontaneous neighbourhood communities, such benefits are perceived as individual pleasure of taking part in creating and controlling the use of a specific area.

3. **Benefits which are transmitted to other community members who are not involved in creating goods that deliver collective benefits**, are a kind of investment made by a community member for future individual benefits derived from community activities, which require:

– involvement of particular individuals associated in a community, who have certain unique specific resources (knowledge, skills, education, etc.), and who were not interested in participating in the work on creation of an individually desired common good;
– acquisition of individuals who are not associated in the community yet, but are required to carry out certain planned activities, including production of common goods. They must be encouraged, so it may be considered to offer them something "towards" their future involvement.

This category of benefits, in the account calculated for a particular community member, is a cost that they incur to create in the future a good which is beneficial to them by agreeing to take part in creating a good desired by another community member. In the urban reality, this category is to the greatest extent threatened with the risk of losing the effects of personal involvement to the benefit of anonymous city users, who are interested in the "free rider" role, i.e. in obtaining benefits from the consumption of good for which they neither paid, nor compensated the obtained profits in any other way.

4. A part of **benefits produced by other community members, which are transferred to the benefit of the entire community**, as a form of participation in benefiting from the entire community's activity and all its common goods. It is acquired by each community member, even if they were not involved in the activities intended to produce a specific good which they use. The share of particular individuals (coefficient "a") does

not have to be identical. It results from the position in the community, which reflects the fact that an individual adopted the rules of its existence. There may be various criteria of access to specific goods, whereby the rules of using the community offer in the long run always to an extent take into consideration the degree of involvement in activities undertaken for the whole group.

In the process of producing common goods, when unit collective benefits appear at the same time, this category arises in the following relationship between its elements:

$$KKj = KI + KP - KPIN + aKCW$$

where:

KKj – collective benefits achieved by an individual (community member),
KI – customised benefits of an individual resulting from personal consumption of collective goods,
KP – private benefits resulting from participation of an individual in a community,
KPIN – benefits that are transferred to other community members who are not involved in creating goods that provide collective benefits,
KCW – benefits produced by other community members and transferred to the benefit of the whole community, a part of which (a) can be used by an individual.

The above operation illustrates the general approach to the term "collective benefits". The defined elements can also be clarified further by being divided into more detailed elements. However, this task seems to go beyond the scientific orientation of economy and falls within the competence of sociologists, or even psychologists, who are significantly better at defining motivations behind various human activities. In the context of urban economy, we are left with the analysis of elements of collective benefits, recognised as a source of profits from the manufacturing activity of a community intended to create a common good, and consequently, to increase the attractiveness of a particular area, which results in a decision either to stay in the city, or to join the users of a different city.

Collective benefits and city development

Defined collective benefits, similarly to common goods, which are their carriers, are a non-spatial category from the theoretical perspective. They may originate wherever communities are established, regardless of the nature of territorial units. If they are produced in the city, their urban character is associated with the existence of a specific lifestyle and special conditions for conducting business activity in urban areas. Economic units are less frequently members of communities, but as active city users, they are very often interested in participating in the creation of desired conditions for activity (Czornik 2017). Urban communities are formed mainly by city inhabitants. By establishing such communities, they complement the municipal offer of public and market goods and services on the one hand, and satisfy the individual needs for co-

operation and people-to-people contacts, on the other hand. The produced collective benefits are the desired effect of each form of involvement.

As a notion that might have a significant impact on the city attractiveness, collective benefits are thus a category that belongs to the set of elements forming the urban reality, shaped in development processes. It is assumed that changes of urban features are designed to provide a better response to the needs of all of its user groups. A city is a unit of settlement, so inhabitants are most important and all urban features should be adapted to their needs, including decisions on granting the consent for the activity of economic units, supra-cultural institutions, as well as the presence of tourists, students and other external user groups. Urban communities are also an important part of the city reality, because they express the will to take active part in creating the city. They offer their members the opportunity to get involved and the related sense of being a driving force behind urban transformations. The awareness of a lack of influence on the changes of urban features that are important for living in the city discourages many inhabitants from taking active part in local politics. Their frustration with inactivity is overcome by forming groups that may become pressure groups which successfully enforce the desired changes in the city. A community connected with an idea, views or achievement of a specific goal may even pose a threat to the existing political order, e.g. by initiating and holding a referendum on removing the mayor, president or city council.

The economic effects of the existence of urban communities are usually underestimated. Self-government and state authorities regard such communities as entities involved in the local areas for solving social problems, which only generate costs and constitute an inevitable element of the existence of human settlements, sometimes being a type of social pressure forces. It is rarely assumed that they can earn income or generate profit.[4] The few examples of actions with measurable financial effects include the community initiatives to organise fund-raising or events (e.g. book fairs, artistic performances) intended to implement charity goals (treatment, care, holidays, reduction of social exclusion, etc.).[5] Urban communities seek funding for their activities in many places and frequently operate only based on member contributions. Despite this, the non-financial collective benefits obtained by their members may have a significant impact on their spatial behaviours, including the decisions to settle in the city or use public goods and services.

Participation in obtaining collective benefits, as a result of activities of urban social groups, is an argument in favour of getting involved in them. At the same time, communities co-participate in the processes of effective urban management, thus supporting

[4] Katowice intended to provide an amount not lower than PLN 14.5 million under the multi-annual programme for cooperation between the city of Katowice and non-governmental organisations (Multi-annual programme for cooperation between the city of Katowice and non-governmental organisations in 2016-2020, p. 9).

[5] The charity foundation called "Siepomaga" declares on their website that over 4.2 mln people have already been involved in their activities (www.siepomaga.pl, access: 11 January 2020).

the creation of urban advantages. Their areas of involvement should include not only social initiatives undertaken by authorities, occasional events or use of cultural sites and sports and leisure facilities. The most valuable thing is to gather the authors of urban goods and services, including people who enrich the entire local offer with their work and talents. Even if what motivates them is their individual or private elements of collective benefits, creation of favourable conditions to gather them is still in the interest of the city. Urban development accomplished in this manner will be expressed by increased satisfaction of inhabitants with the quality of living in the city. This measure of development is not economically precise, but when we translate it to the behaviours of inhabitants, we get an opportunity to examine the migration balance, involvement of people who are interested in building detached houses, renovating flats, planting trees, improving the aesthetic qualities of their city, sponsoring the operation of municipal institutions, as well as voter turnout and distribution of political preferences. Development inspired by collective participation of inhabitants in adapting the city to their needs is a dream of many self-government authorities.

Summary

Common goods are produced by communities, i.e. special social groups formed by individuals who are connected with an idea, goals, views, etc. Collective benefits originate in the process of creating common good. They are a result of cooperation between group members and as such, they are included in the offer of urban common goods. Cities develop in the desired directions if they take into consideration the needs of their users, and particularly their inhabitants, in the first place. Their preferences express well the goals of communities, which are established in order to increase the settlement attractiveness of places in the city, created for them by the local authorities and commercial development authors. Collective benefits obtained from the activity of communities motivate particular individuals to get involved in the changes of urban features which they desire. Although such benefits refer to satisfying individual needs, they result from the existence of communities and are consequently obtained by all their members, thus offering an advantage of being a city user.

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STUDIA MIEJSKIE
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PROBLEM-BASED LEARNING AS A MEANS OF RESTORING SOCIAL FUNCTIONS TO GROUPS ALIENATED FROM THE URBAN SPACE

PROBLEMOWE UCZENIE SIĘ JAKO ŚRODEK PRZYWRACANIA FUNKCJI SPOŁECZNYCH GRUPOM WYALIENOWANYM Z PRZESTRZENI MIEJSKIEJ

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ABSTRACT: The article refers to the process of creating a project by designers from two culturally different countries during the Erasmus project. The project, set in the centre of urban space, aims to limit the alienation of the homeless from the urban environment and to slowly restore their social functions. The aim of the cooperation was to create a space in which designers would use not only technical and compositional knowledge, but would consciously introduce information from social sciences, as well. This project for homeless people, is set in the city of Rzeszów, Poland. The inspiration to do this project was the nature and C2C theory. The structure of the project is based on a modular architecture which, if necessary in the future, can easily be modified, for example, by adding new elements and thus respond to the current needs of the residents. Self-sufficiency is another important part of the project. They are also eco-buildings made of straw bales or recycled materials such as plastic bottles. Thanks to these efforts, a project was created not only for the homeless but for all the residents of the city.

KEY WORDS: homeless people, eco-building, C2C, Rzeszów

ABSTRAKT: Artykuł odnosi się do procesu tworzenia projektu przez projektantów z dwóch różnych kulturowo krajów w ramach projektu Erasmus. Projekt, osadzony w centrum przestrzeni miejskiej, ma na celu ograniczenie wyobcowania bezdomnych ze środowiska miejskiego i powolne przywracanie im funkcji społecznych. Celem współpracy było stworzenie przestrzeni, w której projektanci wykorzystywaliby nie tylko wiedzę techniczną i tworzenia kompozycji, ale i świadomie wprowadzaliby informacje z nauk społecznych. Projekt dla bezdomnych zlokalizowany jest w Rzeszowie. Inspiracją do realizacji tego projektu była natura i teoria C2C. Architektura projektu opiera się na architekturze modułowej, która w razie potrzeby w przyszłości może być łatwo modyfikowana, np. poprzez dodawanie nowych elementów i tym samym odpowiadać na bieżące potrzeby mieszkańców. Inną ważną częścią projektu jest samowystarczalność. Są to również eko-budynki,

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zbudowane z bel słomy lub materiałów pochodzących z recyklingu, jak np. plastikowe butelki. Dzięki tym zabiegom powstał projekt nie tylko dla osób bezdomnych, ale i dla wszystkich mieszkańców miasta.

SŁOWA KLUCZOWE: bezdomni, budownictwo ekologiczne, C2C, Rzeszów

> "Our goal is a delightfully diverse, safe, healthy and just world, with clean air, water, soil and power – economically, equitably, ecologically and elegantly enjoyed."
>
> (McDonough 2005, as: Stouthuysen 2010, 8)

Introduction

The wide openness to many worlds of science driven by globalization and the electronic communication system make us live in an information society with new priorities. At present, we focus on creativity, inter- or even multidisciplinarity, but also – by the above-mentioned assumptions – independence and ability to work with others. Such requirements are set for university graduates who ought not to solely make use of their learned knowledge, but should also develop specific skills related to spheres remaining beyond the subject of their study. Skills acquired during their studies should make it easier for them to find themselves in a group of professionals who independently and creatively solve problems using a comprehensive knowledge not limited to one field.

As regards architecture, realization of these goals is possible through, among others, participation in multi-stage projects. While working on such projects, students practically analyze themes that are not only related to the technical and functional aspects of architectural work, but also have to deal with the humanities – multifaceted aspects related to social sciences such as sociology and psychology.

The aim of the article was to determine the possibility of building positive and lasting neighbourly relations between the inhabitants and underprivileged groups by means of proposing an appropriate spatial treatment. The study was conducted in the form of a case study of testing an alternative method of teaching architecture students, based on observing and solving authentic problems.

Cooperation background

The article draws on the experience of the Erasmus programme. First of all, Erasmus is a program that gives students the opportunity to gain experience of studying in other universities all over Europe. It is not only an experience for students themselves, but for academics who deal with the former, as well. Thus, students are an integral part of the programme when they pursue their educational adventure, still the host institutions that do their best to help them on the day-to-day basis play as much an important role.

The students who were involved in the project that is presented in this study are Gabin Peinado Paula of the University of Madrid and Garcia Gigato Alejandro of the University of Seville, Spain. They both were students of architecture who arrived in Rzeszów to start their 4th year of studies. The subjects they were working on in the

Technical University of Rzeszów were called: 'Urban planning and architecture' (Garcia Gigato Alejandro) and 'First step final project' (Gabin Peinado Paula). The objective of the subjects was to create a place for homeless people to live. The students could choose any location. The main idea was to focus on using cheap building materials and to take into account a limited space available for the dwelling. The main part of this project was that people from two different countries and representing different cultures, in this case natives of Poland and Spain, could be working together successfully. The subject they were working on was called 'First step final project', and as its title indicates, its outcome was meant to be a final architectural design.

The students' work began with holding discussions with their assigned tutor, concerning the leading topic of the project and defining its objectives. The scope of the search area was the issue of cooperation and coexistence between different social groups. The task was to focus on simulating the likely situation where an architectural object could be the beginning of building relationships between hostile social groups and enhancing their interpersonal relationships. During the conversations the students and the professor decided to try to create a place for the homeless to live. First, the students had to analyze the situation of the homeless in the city, the possibilities of their functioning and why they are excluded from the urban space.

An outline of the situation of the homeless in urban space with a particular emphasis on Rzeszów

According to Garcia Gigato Alejandro, homeless people are not accepted in society for several reasons, for example: drug and alcohol addiction, misbehavior, conflicts with neighbours, littering streets. In the opinion of Gabin Peinado Paula, homeless people tend to be lonely and some of them do not want to share their space with anybody, only some of them are willing to stay together and share their lives with others.

The students' observations coincide to a large extent with the conclusions from analyses of literature concerning the problem of homelessness. Australian researcher M. Tudehope (2011) claimed that during the survey he had conducted the homeless mainly pointed to the balance of needs, providing protection from the elements, providing security (respondents pointed to the feeling of fear of violence and theft) and the lack of intimacy – they were constantly under the pressure of public observation. He also indicated that it is a definite mistake to think about the situation of the homeless mainly in terms of throwing them out of the space instead of regarding them as members of the community with full rights to this space. Throughout the world, however, there is a growing tendency to exclude homeless people from the public space and to strive for the state of hidden homelessness. As Petty (2016, 67-81) describes it, in cities we observe manifestations of 'hostile architecture', also known as 'defensive' or 'disciplinary', whose image is the installation of elements that exclude the use of space by certain social groups. In the case of homeless people, they can be, for example, spikes installed in places where they like to organize their resting places.

"Our cities must be places where human beings lead fulfilling lives in dignity, good health, safety, happiness and hope" (United Nations, 1996). The quotation from the declaration adopted at the UN conference Habitat II in Istanbul in 1996 emphasized the equal right to space for all users. This helped to activate the creative community in developing solutions addressed to the homeless. Initially, the answers were mainly dominated by mobile architecture perceived as the one that best fits the lifestyle of the homeless person. Projects of recognized artists, such as *Basic House* by Rakowitz, *Snail House* by Ion Sørvin, a multifunctional unit that serves as a place to sleep, eat, shelter and protect the accumulated property and assists users in their daily activities, such as collecting bottles designed by Krzysztof Wodiczko or *The SR-Hab* prototype (*Socially Responsive Habitat*) by Anna Rewakowicz (Rybka and Kozłowska 2016, 320). However, a deeper analysis of the existence of homeless people in the community leads to searching for cooperation and not transferring of the finished product. Solutions that involve the homeless in the construction of their homes, with the participation of social workers, administration and designers, of course, increase their self-esteem, creativity and are a good reason to break out of stagnation. More and more often social services stress that breaking out of the state of homelessness, especially the perpetuated homelessness, is extremely difficult if there is no idea of participation of the homeless in the creation, responsibility for the place and their own fate and is based only on being given ready-made products. Sharing responsibilities and meeting people are therapeutic by their nature, as Jerzy Łątka stresses. At the same time, this author puts forward the idea of creating helpful architecture as an alternative to this cooperation – easy to construct from properly developed paper construction elements (Łątka 2017). A perfect example is also the construction of a deep-sea ship by the homeless in Warsaw's Ursus, where the skills of the homeless were used to create a vessel to sail on long voyages (Kołodziejczyk 2009).

Undoubtedly, the most frequently chosen environment for homeless people is urban space. "The urban environment is becoming a vital niche to sustain the daily lives of the homeless. In the city, various elements come together: the destiny of the population, people offering financial help, free food, services and institutions supporting the homeless, and an abundant availability of recyclable material" (Rybka and Brudnicka 2018, 3). In Rzeszów, the city which the Spanish students chose to implement their projects in, the number of homeless people reported in 2017 was about 140 (Podkarpacki UW 2017). The main concentration of homeless people in this city takes place in the following two housing estates located in the city centre: Śródmieście Północ and Śródmieście Południe.

Main targets of the project

In their works, the students decided to express their opposition to the tendency of excluding the homeless from the city space and striving for the state of hidden homelessness. They planned to introduce the homeless into the public space of the

city of Rzeszów, of course, each of them proposed a different concept. An additional advantage of both concepts was the creation of architecture that could be built by the homeless with the use of recycled materials, mainly materials invented by themselves, which made the concept of both students economically viable. This behavior regarding respect for nature's patterns was inspired by the cradle to cradle theory (C2C) created by McDonough and Braungart. The basis of their ideas was a design based on the intelligence of natural systems. They assumed that cradle materials should become part of a biological or technological cycle of nutrients. This means that consumer materials should be biodegradable, applied to the natural life cycle of a product, or used in a closed-loop technology system and used indefinitely (Bakker 2010, 2-8; see also: Mcdonough 2005). Gabin Peinado Paula decided that it must be the place where everybody can share something and help the city to get better. Garcia Gigato Alejandro decided on the idea ¨A city into the city¨. Generally, this idea ensures that the homeless are adapted in society.

The next problem was selection of the location. The students' idea was to do a social project that must be in continuous relation with the people of the neighbourhood. The main idea was to generate a good relationship between neighbours and homeless people, as well as the process of rehabilitation for them by building their own place. They told theit tutor that if a market and some shops are built in the neighbourhood where homeless people are able to work, they will establish a good relationship with the local community. And at the same time, they will earn enough money to live a decent life. With the money and the house that they are helped to put up, they will start a new life. Thus, it is understandable that the students' point was to place their designs in an area with a lot of people around. Consequently, the tutor supported them in their taking the final decision in this respect and the place was agreed on.

In addition, the students chose sites that themselves required revitalizing: in the case of Paula's proposal, it was a mess left behind the former market, whose primary function Paula kept as a co-major subject. Alejandro chose a location in the center of the old town, namely a scarcely used small park. Both locations were selected in the neighbourhood of housing estates, in the proximity of health care centers and potential shelters for the homeless. In either case, these were newly-designed or nearby tags. Both locations were selected in the downtown area of Rzeszów and offered a very good access to public transport.

Each week the students came to their supervising professor to solve different problems that had occurred. They also brought some ideas into discussions with the tutor, concerning the best logical solution to the problems, such as the limited budget available for the project, being one of the most important ones. The buildings had to be very cheap, so together they came up with the idea of using some recycled materials. In addition, in order to as much as possible prevent the destruction of the building, its construction had to take into account a significant contribution to the process of creating it by its future users, that is the homeless who were not necessarily expert in building. So it had to be easy enough for the homeless to be able to create it under the

right guidance and professional help. With their ideas and the professor's contribution, working together and supporting them in a good way in everything that they were doing, they managed to present a good project based on their initial ideas.

The above instance may serve as a good example to follow for all teachers in this field, namely if we support and help students to promote their ideas instead of changing everything, they are capable of creating amazing things. Students are the future and they must learn how to materialize a good idea, even if the idea looks impossible at the beginning. The main idea of Paula's project was to do something, using not very expensive materials, to find a place in the city and to design it in such a way that it should match the city and the kind of life that we have in here.

Accordingly, Paula carefully analyzed the modular architecture that allows constructing repetitive elements, which is relatively easy to learn. Paula's inspiration was nature. The pattern of its module was found in honeycomb, bubble raft and snowflakes. These examples have one feature in common – hexagonal cells (Fig. 1). Doing it like this, we obtain the possibility of creating a dwelling which is less material-consuming, more resistant, and can have more modules added to the project due to its form. The material chosen for the building was straw bales, currently rarely used in Poland. Still, the advantages of the straw-bale construction over conventional building systems include the renewable nature of straw, lower cost, easiness of availability, naturally fireretardant and high insulation values.

The main idea of Alejandro's project was to build a center for homeless people, using shipping containers (Fig. 2). The idea of such a construction is very interesting and around the world there are a lot of examples of shipping containers architecture. However, such a kind of construction means dealing with unique know-how issues, not typical of residential construction which makes use of traditional materials. The main problems are related to corrosion in the areas of welding containers together and in points of their contact with the foundation. To resolve this problem specialist welding is required. Thermal insulation also poses a problem that needs solving (apart from corrosion). It proves better to insulate shipping containers for accommodation purposes from the inside to avoid problems with condensation. Taking into account the material of which the structure will be built, there is the practical problem of hanging furniture (such as cabinets in the kitchen). They need designing already during the construction process.

The students' first idea was to start making an eco-building with straw-bale as the main material (as proposed by Paula), and doing a modular architecture by both. With these two ideas, both the students and the professor started their design with a lot of possibilities. It is interesting how the students approached the project on the urban space, neighborhood and architectural scale within the resort.

Paula's design varied in different parts, because, as we know, homeless people are typically lonely and some of them do not want to share their space with anybody else; nevertheless, some others can like to stay together and share the space with somebody.

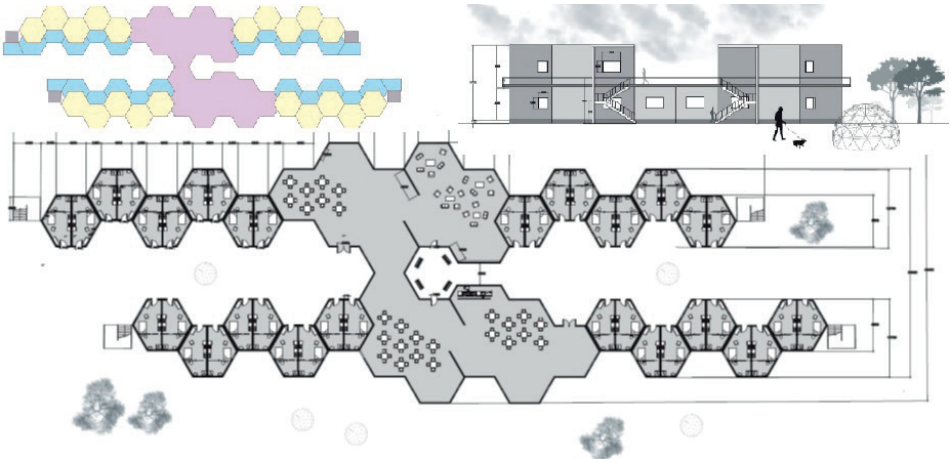

Fig. 1. Scheme of the first floor, plan section-first floor, Elevation. Design by Gabin Peinado Paula
Source: Gabin Peinado 2017.

Consequently, the main parts of Gabin Peinado Paula's design included the following (Fig. 1):

– the house: each homeless person would have a place to live, equipped with an individual bathroom and a small kitchen,

– the big building: we can explain this design, saying that it is divided into 4 main parts which are connected by a big building in the center. In this building we can find a place to share, where we can find tables, chairs, sofas, a bookcase and also a kitchen,

– the orchard: located in front of the houses, this part will help the homeless to be self-sufficient.

Paula focused heavily on the exterior of the building, she wanted a building that would be integrated in the environment, as far as possible, so it should be a space which the homeless and citizens of the town enjoy staying in. That is why the entire roof of the first floor is walkable. You can access that roof from 4 sides of the building sited in each part of the building. The stairs are always an open space with easy access, which means that you do not have to access the interior of the building you can simply walk over.

A similar approach to the performance of functions can be found in Garcia Gigato Alejandro's design. He also parted the homeless to provide privacy and designed common shared spaces. The whole urban structure is divided into the following zones (Fig. 2):

– the leisure zone for children, with some children's games,

– a market and small shops,

– the residential zone for homeless people, located further away from the busiest area, which provides more privacy.

Combining ideas supplied by a professional teacher from Poland and a young student from Spain offered the opportunity to create something unimaginable. The student had

Fig. 2. Location plan – ground floor and residental section. Garcia Gigato Alejandro's design
Source: Garcia Gigato 2017.

to visit the teacher at least once a week to check that everything was going in the right direction, with corrections such as: the students came with the idea of doing an orchard in some kind of geodesic dome, but the teacher's suggestion was to do it with plastic bottles filled with water to keep it warm during the cold weather and at night. With all this, including good cooperation between the student and the professor, we can make a big change, and it does not matter if the designers are from different countries and they have different ideas and notions of architecture.

If we encourage our students to do it in their way, but under the wise supervision as teachers, we can create amazing things and keep our students interested and creative, offering our help and experience whenever necessary. Combining thoughts coming from different countries can make a big difference. The creation of such a project would not be possible if the teacher imposed his own ideas on students. Working together and supporting each other contribute to suggesting new and fresh ideas; moreover, it always encourages students to do things better. Students can surprise us in many good ways.

Materials and technology

This can be a sustainable way of living and arranging for their own dwelling for the homeless in the South of Poland, since homeless people can build a miscanthus bale houses by their own hands. This ornamental grass is more and more often grown in home gardens in southern Poland. It also looks attractive in public green areas. The diversity of this grass and its growth rate gives architects a wide range of possibilities.

Amongst this rich group of perennials, *miscanthus giganteus* attracts special attention. As one of the highest-growing grass species in the Polish climate, it looks great when planted alone or in compositions with other perennials (Helios 2017). *Miscanthus gigantus* was brought to the South of Europe from Southeast Asia around 1930 as an ornamental plant. The species appeared as a result of a natural cross between *miscantus sinensis* and *miscantus sacchariflorus*. Short rhizomes are the underground part of *miscantus giganteus*. Every year in spring, foliage, lush shoots grow from them, forming magnificent, dense clumps. The homeless will be living in temporary houses besides the construction site. They will have a large vegetable garden and public place where miscanthus will be cultivated. They will build a miscanthus bale house that is low cost and low tech investment, using natural materials: low cost – because they do not afford a mortgage; low tech – because they want to put it up themselves. A good example of such a technique is their wood splitter, logging wheels. During the building process they will not have to use a crane. The miscanthus bales will be placed in the walls and will be plastered outside. After completing this, there will be time to work inside: oiling round wood, plastering inner walls, fixing the root cellar. They will be very interested in learning to work with natural building materials. Because of fire hazard smoking will be not allowed on the premises.

The advantages of miscanthus bale construction are many (Lewandowski 2018):

1. Sustainability – a miscanthus bale is totally renewable material, waste product of green production, which absorbs CO2 during growth and locks it into the home construction. A comprehensive carbon trace analysis of miscanthus bale materials production, transport and use usually yield a significantly lower trace. In particular, transport in this case is really low.
2. Beauty – miscanthus bale walls are at least eighteen inches thick and this adds an aesthetic value to a home that is desirable but rare due to the expense it would incur with a conventional construction. This wall thickness provides beautiful and useful flat surfaces throughout the home while additionally helping to reflect sunlight and brighten rooms. It also means that every window can have a window seat or shelf, providing both an aesthetic and practical design element.
3. Easy to construct – the basics of a miscanthus bale construction are easily understood by even novice builders. With some supervision from an effective miscanthus bale project leader, a first time builder can be a part of the complete construction process and an expert to build with success.
4. Low cost – if they live in an area where miscanthus is grown, miscanthus bales will be easy to acquire and are definitely affordable.
5. Effective thermal insulator – the average miscanthus bale provides insulation values between R-35 and R-40 and U-values between 0.20 and 0.15 W/m^2K. The thicker the bale, the higher the insulator value resulting in miscanthus bale as an essential comfort choice where heating is necessary.
6. Fire retardant – the density of miscanthus bales and common encasements like plasterboard make them resistant to fire.

7. Bio-degradable – miscanthus as the plant is normally bio-degradable. At the end of the constructed object's lifespan the material gracefully returns to the earth, without leaving toxins behind.

8. Noise insulation – the thickness and density of a miscantus bale construction makes walls good sound barriers.

9. Healthy – miscanthus bale walls provide an excellent foundation for an organic, voc-free and low-allergen living environment.

Conclusions

The basic assumption behind the project was to apply a teaching method based on the observation of real problems. This method, according to Lubina (2005, 224-231), is a method that allows project participants to manage the process of acquiring skills, stimulating creativity, curiosity about the world and enables better social functioning. Of course, the success of the implementation depended on the creative potential of the participants. Moreover, the implementation of this project allowed students to personally face a real social problem and to build their own knowledge base, not acting in a way that uses only other people's experience. An important achievement was also the strengthening of the argumentation in favour of reorientation of the approach to the homeless and an attempt to change their perception by society only as spatial outsiders, especially in public spaces. Another value of the project was an attempt to create a solution that is technically feasible for the addressees of the project, i.e. the homeless in this case. This approach strengthens the sense of respect for the place and oneself, builds responsibility for one's own fate and the sense of belonging to a specific place. In addition, it was extremely important to take into account ecological apsects, using mainly materials that would allow to significantly reduce costs and the negative impact on the environment, including creation of technical recycling by, for example, using containers that are not suitable elsewhere. Summing up, the implementation of this method in the design of an architectural project was possible and led to the creation of two mature and analytical responses, where the intention was to build a place in which everyone can share something, help the city, feel better and follow the words of the creators of C2C theory to be "less bad" for the environment (Bakker 2010, 2-8).

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STUDIA MIEJSKIE
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WROCLAW PARTICIPATORY BUDGET AS A TOOL TO STRENGTHEN NATURAL CAPITAL AND THE URBAN CLIMATE RESILIENCE IN THE YEARS 2016-2018

WROCŁAWSKI BUDŻET OBYWATELSKI JAKO NARZĘDZIE DO WZMACNIANIA KAPITAŁU NATURALNEGO I ODPORNOŚCI MIASTA NA ZMIANY KLIMATU W LATACH 2016–2018

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ABSTRACT: Participatory budgets are a popular form of residents' co-deciding about public space and quality of life in their cities. Projects submitted to participatory budgets respond to needs such as recreation, health, communication and safety. This article evaluates the projects from 2016-2018 of the Wroclaw Participatory Budget in terms of aspects related to the wider issue of the natural capital and climate change. The results obtained indicate that despite increasing financial outlays on projects that can contribute to strengthening environmental and climatic aspects, the share of investments directly targeted at their implementation is relatively small. A total of 201 projects were analyzed, of which 12% directly and 18% indirectly referred to issues related to the natural capital and/or climate change.

KEY WORDS: participatory budget, natural capital, ecosystem services, urban climate resilience

ABSTRAKT: Budżety obywatelskie stanowią popularną formę współdecydowania mieszkańców o przestrzeni publicznej oraz jakości życia w mieście. Zgłaszane do budżetów obywatelskich projekty odpowiadają na wiele istotnych potrzeb dotyczących m.in. rekreacji, zdrowia, komunikacji czy bezpieczeństwa. W niniejszym artykule dokonano oceny projektów Wrocławskiego Budżetu Obywatelskiego z lat 2016–2018 pod kątem aspektów związanych z szeroko rozumianym kapitałem naturalnym oraz zmianami klimatu. Otrzymane wyniki wskazują, że pomimo rosnących nakładów finansowych na projekty mogące przyczyniać się do wzmacniania aspektów środowiskowych i klimatycznych, udział inwestycji nakierowanych wprost na ich

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realizację jest stosunkowo nieduży. Łącznie przeanalizowano 201 projektów, z czego 12% bezpośrednio, a 18% pośrednio dotyczyło zagadnień związanych z kapitałem naturalnym i/lub zmianami klimatu.

SŁOWA KLUCZOWE: budżet obywatelski, kapitał naturalny, usługi ekosystemów, odporność miasta na zmiany klimatu

Introduction

Participatory budgets

The participatory process related to a city budget was first introduced by a bottom-up initiative in the Brazilian city of Porto Alegre in 1989 (de Sousa Santos, 1998). In the late 1990s, the idea of a participatory budget spread throughout Latin America and then reached, among others, European countries, as presented in a synthetic historical-geographical perspective by M. Rachwał (2013). Some of these countries have made legislative changes in order to facilitate the involvement of residents in the decision-making process (Burchard-Dziubińska, 2014).

The participatory budget in Poland dates back to 2011, when the city of Sopot started to apply this procedure. In the following years it gained popularity, gradually reaching the number of nearly 60 cities in Poland. However, in Polish legislation the provisions relating to participatory budgets appeared only as a result of changes in the functioning of local governments introduced by the Act of 11 January 2018, amending certain laws in order to increase the participation of citizens in the process of selecting, operating and controlling certain public bodies (Journal of Laws, 2018, item 130) (Błaszak, 2019). In accordance with the provisions of the act, the participatory budget is aimed at increasing civil participation in the process of selecting, functioning and controlling certain public bodies. It embraces also a special kind of social consultation, where inhabitants annually decide on a part of the municipality's budget expenditure. All cities with district rights are required to create a participatory budget amounting to at least 0.5% of the municipality's budget expenditure of the previous year.

Participatory budgets of large Polish cities are the subject of interest mainly in terms of co-management of the city and its finances (Burchard-Dziubińska, 2014; Łukomska-Szarek, 2014; Rachwał, 2013), civil society (e.g. Brylski, Połom, 2019) and in relation to particular cities (Leśniewska-Napierała, 2017; Pietrusińska, 2017; Brylski & Połom, 2019). According to research on the Wroclaw Participatory Budget, in 2014 only 7 out of 89 projects (8%) were submitted in the "urban green". Their value represented 14% of the value of all projects accepted for implementation (Solecka, Dworniczak, 2016).

The Wroclaw Participatory Budget (WPB) was initiated in 2013. Following the website of the WPB,[1] it is a process that allows residents (not being councilors) to discuss and directly influence decisions on the allocation of part of the public budget for proj-

[1] https://www.wroclaw.pl/rozmawia/wroclawski-budzet-obywatelski

ects directly reported by residents (see also Sintomer et al., 2008). The residents create their own projects, which directly address their needs.

Natural capital and urban climate resilience

The direct benefits for the city and its inhabitants of the participatory budget are related to the use of urban space, influencing the quality of life through, for example, its function for spending leisure time. However, many functions of urban space are less visible than, among others, the possibility to go for a walk, cycle, conduct daily activities in a pleasant environment and related to positive externalities. An example can be the infrastructure (Platje, Paradowska, Kociszewski, 2018) where shorter travel time and improved air quality resulting from a sustainable transport policy, are not directly visible. Some of these not visible functions provided by natural capital and urban ecosystems are also important to preserve or improve the resiliency of the city concerning climate change. Urban ecosystems are understood here as all natural green and blue areas (GBI – green and blue infrastructure[2]), performing a number of ecosystem services such as air filtration, microclimate regulation, noise reduction, rainwater collection and drainage, sewage treatment as well as recreational services (Bolund, Hunhammar, 1999). These services are derived from natural capital – a concept which was developed in the 1970s (Schumacher, 1973; Westman, 1977). One of the recent definitions indicates that natural capital is *another term for the stock of renewable and non-renewable resources (e.g. plants, animals, air, water, soils, minerals) that combine to yield a flow of benefits to people*,[3] where the flow of benefits is related to ecosystem services. These services can reduce the necessity to provide them in a different and cost-saving way – for example, cooling urban areas by trees can have an annual value of millions of dollars (Gómez-Baggethun, Barton, 2013). Following an economic approach to urban ecosystems, GBI is in fact a *form of critical natural capital, able to generate a flow of material benefits* (Matthews, Lo & Byrne, 2015).

One of the critical issues nowadays concerns the negative effects of climate change, leading to an increasing number of cities to declare climate emergency.[4] A huge problem is the intensification of adverse effects of climate change, i.e. increasing heat waves, reduced rainfall, occurrence of torrential precipitation, etc. (van Vuuren et al., 2011). The intensity of the occurrence of these phenomena is related to the presence and quality of green and water areas, including elements of green and blue infrastructure.

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[2] Defined as: "a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas. On land, GI is present in rural and urban settings" in: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Green Infrastructure (GI) — Enhancing Europe's Natural Capital (European Commission, (2013).

[3] https://naturalcapitalcoalition.org/natural-capital-2/

[4] https://www.cedamia.org/global/

A possible solution can be the development of GBI into urban space, since there is a direct relationship between vegetation and natural water retention, as vegetation is a biological water reservoir which, in turn, is necessary for the growth of vegetation (Wagner, Krauze, 2014). The introduction of new biologically active surfaces in the form of GBI or improved management of existing ones, strengthens the natural capital and as a consequence contributes to urban climate resilience (see Meerow et al. 2015) – *the degree to which cities tolerate alteration before reorganizing around a new set of structures and processes* (Alberti et al., 2003). When thresholds are exceeded, this may trigger off a transformation process. In order to prevent such a scenario, or smoothly go through such a process, a resilience approach including natural capital should be considered in planning, management and governance (McPhearson et al., 2014).

In 2019, the document called *Adaptation Plan of the City of Wrocław to climate change by 2030* (Wroclaw City Council Official Bulletin, 2019, item 319) was accepted, identifying climate indicators, scenarios, and proposals for adaptation measures for the city. According to this document, the most important potential threats for Wroclaw are thermal phenomena associated mainly with rising temperature, heat waves and urban heat island and the increasing incidence of torrential rain, as well as rainfall-free periods with high temperature. Taking this into consideration, it is highly important to properly plan and develop urban public spaces; furthermore, institutional aspects should play a key role in understanding the importance of the natural capital and GBI in adapting cities to climate change (Matthews, Lo & Byrne, 2015). It should also be noted that most of the ecosystem functions are a kind of public good, where there is no rivalry in use and no exclusion (Cornes&Sandler, 1996; Platje, 2011). For this reason, there is a task for the local government in providing such public goods.

WPB characteristics

Since 2013, 334 projects have been approved in WPB and most of them have already been implemented. In 2016-2018, projects could be submitted for 1 of 11 categories including roads, education, public transport, walking/cycling, playgrounds, courtyards, revitalization, sport, historic, green space/recreation and Green WPB. These categories are the topic of research in this paper.

Although the projects submitted to the WPB did not have to meet any specific criteria related to the natural capital (broadly understood) or climate change, they had to fit in the strategies and programs of the Wroclaw municipality. For the period 2016-2018, the following documents were in force: *Study of conditions and directions of Wroclaw's spatial development* (Wroclaw City Council Official Bulletin, 2018, item 5), *Environmental protection program for the city of Wroclaw for 2016-2020 with a perspective up to 2025* (Wroclaw City Council Official Bulletin, 2017, item 481), executive documents such as the *Ordinance of the Mayor of Wroclaw regarding the management of rainwater in Wroclaw* (City Mayor Ordinance No. 1158/19) and the *Ordinance of the Mayor of Wroclaw regarding the protection of trees and the development of green areas of Wroclaw*

(City Mayor Ordinance No. 1217/19). In particular, the last two documents refer to the natural capital and adaption to climate change.

The aim of the article is to examine and provide an initial assessment of the significance of aspects related to climate change and natural capital in the projects implemented under the WPB. First, methodological issues are performed, then research data as well as the results and conclusions are presented. These results may be the basis for developing specific criteria for assessing initiatives and their importance for climate resilience and ecosystem functions related to the natural capital.

Methodology and research

The subject of the study was the verification of projects under the Wroclaw Participatory Budget (WPB) in terms of their contribution to the natural capital and urban resilience. Content analysis was applied to the description of all the 201 projects that qualified for WPB for the period 2016-2018. Three types of analysis were used for the verification of projects (see Fig. 1).

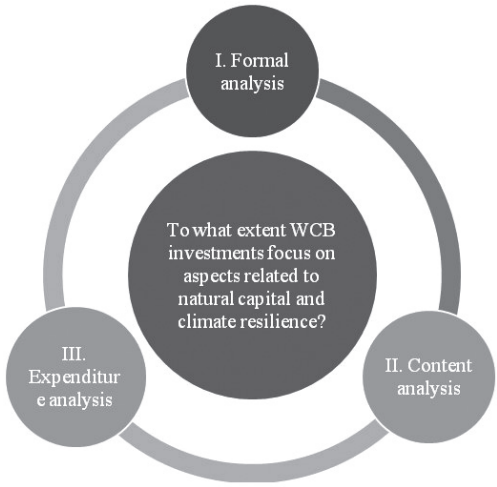

Fig. 1. The research scheme

Source: authors' own elaboration.

Ad. I. Formal analysis was used in order to assess how many qualified projects included elements directly related to the natural capital. Two categories were identified: green areas/recreation and Green WPB.

Ad. II. The content analysis included assessment of each project based on its content. This stage was divided into two parts:

1. Identification and quantification of the type of activities related to the natural capital and their impact on the natural capital and climate resilience.

2. Analysis in terms of anticipated environmental and climate benefits.

The projects then were divided into groups according to the following criteria:

– projects including activities related to planting new trees and/or bushes,

– projects including activities related to the care/revitalization of greenery,

– projects including activities related to the development of green and blue infrastructure,

– projects including activities regarding retention of rainwater.

Based on the above-mentioned criteria and analysis of the content of each project, a categorization key was created resulting in three categories of projects. These categories were called groups in order to distinguish them from the previously described WPB categories. The groups were codified and ranked from the most favorable (Code 1) to the least favorable (Code 3). The outcome is presented in Table 1. The concept of "projects meeting/partially meeting the criteria" includes projects that meet at least one of the above criteria.

Table 1

Groups of projects according to the degree in which they contribute to strengthening the natural capital and increasing urban resilience

Group code	Description of the project group
1	Projects fulfilling the criteria (aimed at the natural capital and adaptation to climate change)
2	Projects partially fulfilling the criteria (at least one of the criteria fulfilled, but not being the main aim of the project)
3	Projects not fulfilling the criteria

Source: authors' own elaboration.

The second stage of the research was content analysis. The content of the projects was analyzed from the point of view of the terminology usage indicating a relation with the natural capital and/or urban climate resilience. Also indirect indications were considered, such as planting plants in cases where in the description of the project the benefits for the natural capital and climate resilience were not mentioned.

The evaluation of the projects was based on the declared benefits, such as:

– nature benefits – project descriptions clearly indicating the benefits for nature and its impact on humans,

– climate benefits – project descriptions clearly indicating the benefits generated by nature for microclimate, air quality, etc.

This allowed determining in which part of the projects the benefits for the natural capital and climate resilience were directly indicated.

Ad III. The expenditure analysis concerned the estimated financial expenditures on realization the projects from Groups 1 and 2, identified in the content analysis. First, the number of projects in each of the three groups (Table 1) was identified. The project

budgets had to go through a procedure – they were verified by the administrative units responsible for the project implementation in co-operation with the project leader. Afterwards, this information was sent to the Wroclaw Participatory Budget Team and posted on the website. The estimated financial expenditures for each project can be found on the WPB website.[5] This information allowed calculating the share of the projects in Groups 1 and 2 in the total of projects as well as in the total budget for the period 2016-2018.

Research data and results

On the basis of formal analysis, among the 11 categories in which WPB projects could be submitted in 2016-2018, only 2 were directly related to aspects of green space and thus the natural capital. Table 2 presents the number of projects in each of the 11 categories.

Table 2

Number of projects in individual WPB categories in 2016-2018 (I. Formal analysis)

Category of projects	2016	2017	2018	Sum
Roads	8	5	0	13
Education	9	0	0	9
Other	4	1	3	8
Public transport	0	0	1	1
Walking/cycling	11	11	6	28
Playgrounds	7	4	7	18
Courtyards	0	3	2	5
Revitalization	2	1	0	3
Sport	6	16	7	29
Historic	0	0	2	2
Green space/recreation	19	23	35	77
Green WPB	0	8	0	8
SUM	66	72	63	201

Source: authors' own elaboration based on: https://www.wroclaw.pl/rozmawia/wroclawski-budzet-obywatelski (date of access 10.05.2019).

The largest part of the projects qualified for implementation concerned green space / recreation – 77 projects, which accounts for 38% of all the projects. Green WPB contained 8 qualified projects yet it was a separate category only in 2017. The share of the natural capital and climate resilience related projects increased from 29% in 2016 to

[5] https://www.wroclaw.pl/rozmawia/wroclawski-budzet-obywatelski

43% in 2017 and 52% in 2018. Based on the second type of analysis (content analysis), 3 groups of projects were identified according to the criteria presented in the methodological section. The results are presented in Fig. 2.

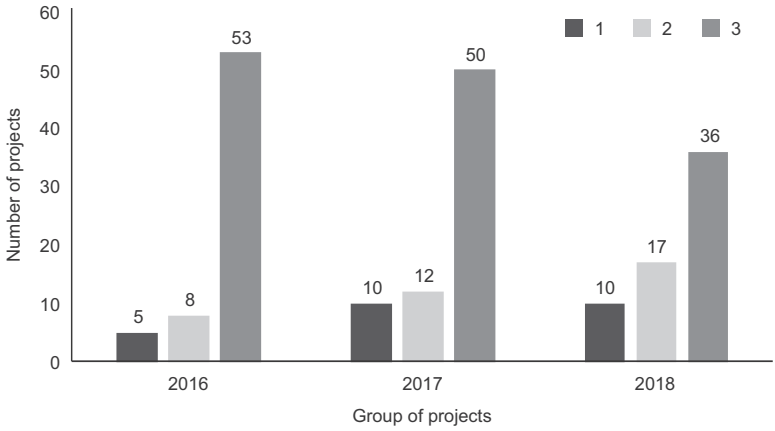

Fig. 2. Number of projects in 2016-2018 divided into groups according to their contribution to natural capital and urban climate resilience (II Content analysis)

Source: authors' own elaboration based on https://www.wroclaw.pl/rozmawia/wroclawski-budzet-obywatelski (date of access 10.05.2019).

The content analysis showed that none of the approved projects met the criteria for activities related to retaining or draining rainwater. Group 1 projects mainly concern new vegetation and care / revitalization of vegetation, or were related to the creation of green and blue infrastructure. The overwhelming share of these activities focused on the creation of parks, green yards and squares, pocket parks. There were also some projects aimed only at planting trees and shrubs. As part of three projects, it was proposed to create flower meadows. In three other projects, the idea was to plant ivy on a building as well as on the "Reagan Roundabout" (Rondo Reagana) – the communication node and construct acoustic screens. In two other projects, the aim was to create green bus/tram stops. Although this group is crucial for strengthening the natural capital, nature protection and ecosystem services in the city, it was the least numerous in each analyzed year, with a total of 25 projects implemented in the period 2016-2018 (which constituted 12% of all the examined projects).

A total of 37 projects (18% of all analyzed projects) can be assigned to Group 2, where activities meeting the criteria, constituted at least one (though not the most important) element of the entire project. The activities proposed in the projects most often associated with planting and/or care of vegetation in projects aimed at recreational investments, such as playgrounds. There was one project that included green acoustic screens planted with ivy, one concerned a flower meadow and one a green fence for a kindergarten.

The largest number of projects – 139 (69% of all the projects) can be categorized as Group 3 projects, as they did not meet any of the criteria. These projects concerned mainly recreational investments, such as outdoor gyms, various types of playgrounds, bicycle paths, health paths, park infrastructure elements (alleys, benches, litter bins, toilets), as well as lighting for parks, squares, construction of sidewalks or parking lots.

As shown in Fig. 3, when combining the formal analysis (I) with the first part of the content analysis (II.1) for the entire period, it turns out that 25% of the projects that fit into the green / recreation category belong to Group 1. A slightly larger share (30% of the projects) can be considered as Group 2 projects. The majority of projects (55%) belong to Group 3. In case of Green WPB, 5 out of 8 projects belong to Group 1, and 3 out of 8 to Group 2.

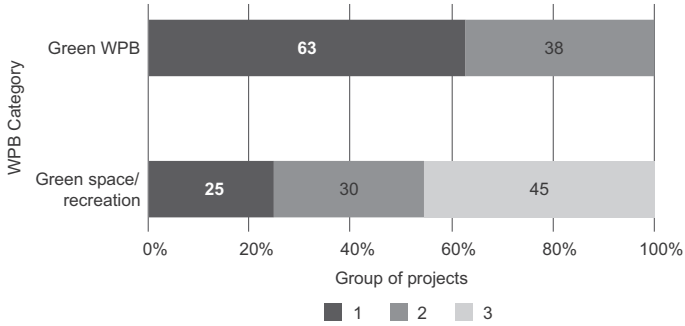

Fig. 3. Share of Group 1 and Group 2 projects in WPB categories greenery / recreation and Green WPB.

Source: authors' own elaboration based on https://www.wroclaw.pl/rozmawia/wroclawski-budzet-obywatelski (date of access 10.05.2019).

The second part of the content analysis concerned the benefits of the natural capital and climate change, which were directly indicated in the project descriptions. In both groups there were the same number of projects with 5 descriptions listing both nature and climate benefits. As shown in Fig. 4 and 5, projects from 2016 identified environmental benefits and 5 climate benefits. In subsequent years, the number of these projects decreased to 5 in total in 2018.

Despite the downward trend, it cannot be concluded that less attention is paid to the natural capital and climate resilience. Not directly mentioning benefits does not necessarily mean that these benefits do not exist. In the case of projects involving planting and/or maintaining vegetation, the final effect will be beneficial both in terms of nature and climate resilience. This research rather focused on the declared benefits of projects. However, the initiators of the projects are not necessarily aware of some potential benefits (as well as potential side effects) (see Sterman, 2000; Taleb, 2012). This issue needs to be researched in the future.

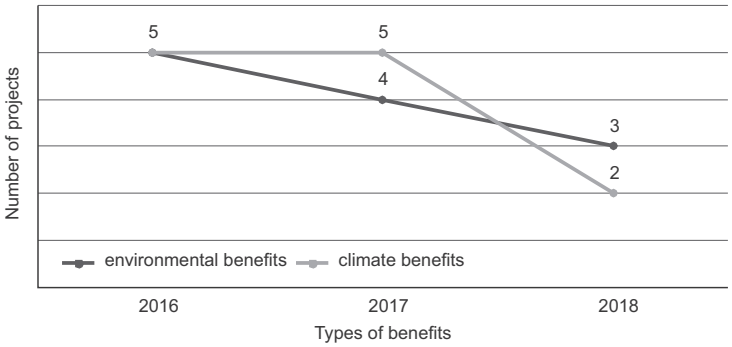

Fig. 4. Number of projects with environmental and climate benefits in individual years

Source: authors' own elaboration based on https://www.wroclaw.pl/rozmawia/wroclawski-budzet-obywatelski (date of access 10.07.2019).

The last stage of the analysis referred to the financial expenditure as a share of total expenditure on WPB projects (Fig. Fig. 5 and 6). Each year a total budget of PLN 25 million (about 6 million euro) was available, while in 2017 an additional budget was granted for green WPB. The exact amounts were PLN 24.335 million for 2016, PLN 29.71 million for 2017 and PLN 24.95 million for 2018. In 2016, PLN 6.5 million was spent on the projects from Group 1 and 2 – nearly 27% of the total budget. The expenditure on these projects in 2017 weas significantly higher.

However, PLN 11.49 million (almost 39% of the total budget) included the additional PLN 4.82 million for green WPB. In 2018, the total expenditure was PLN 10.85 million, 43.5% of the total. The expenditure increased by more than 60% compared to 2016, as well as 2017 when the additional green WPB is not considered.

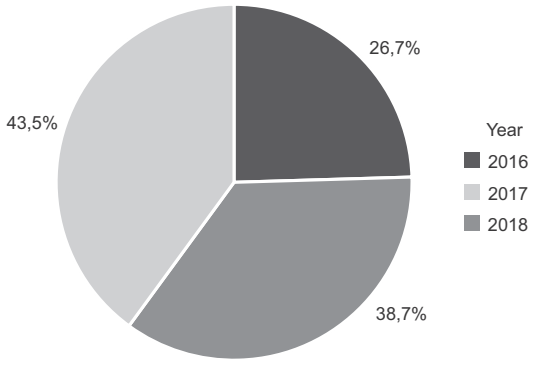

Fig. 5. Share of the WPB budget allocated to 1 and 2 group projects

Source: authors' own elaboration based on https://www.wroclaw.pl/rozmawia/wroclawski-budzet-obywatelski (date of access 10.05.2019).

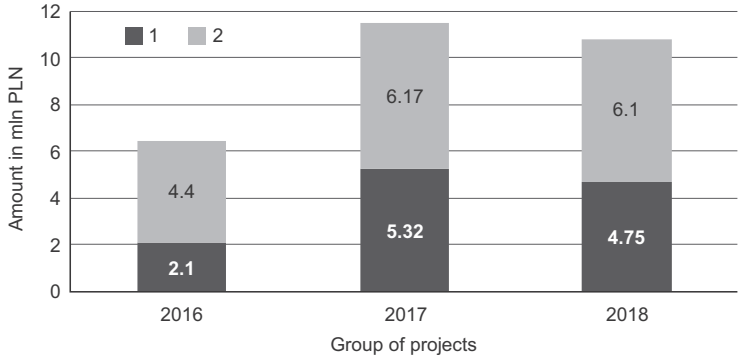

Fig. 6. Group 1 and 2 budget within 2016-2018

Source: authors' own elaboration based on https://www.wroclaw.pl/rozmawia/wroclawski-budzet-obywatelski (date of access 10.05.2019).

Conclusions

The participatory budget is a way to increase public involvement of the decision process concerning the directions of urban development. Despite the fact that the participatory budget does not exceed 1% of the total budget, inhabitants can have a visible influence on shaping public space. It is especially important in an age of climate change – rising temperatures, heat waves as well as sudden heavy rainfall. A promising solution for the negative consequences of these phenomena is development of green spaces which contribute to raising the natural capital of the city and thus support adaptation processes, increasing urban resilience.

According to the research, only 12% share in all the analyzed projects within 2016-2018 contribute fully to strengthening the natural capital and increasing the city's resilience to climate change (Group 1). Their value more than doubled from 8.6% in 2016 to 19.0% in 2018. Taking into account projects from Group 1 and Group 2 (in which projects related to the analyzed issues are implemented as a part of other investments), their value increased from 26.7% (2016) to over 43% (2018). In relation to the results from 2014 (Solecka, Dworniczak, 2016) there is a visible positive change from 8 projects in 2014 to 35 projects in 2018 in the category of "green space/recreation".

Among the discussed groups of projects, a significant impact, in terms of benefits for the natural capital and adaptation to climate change, was made by the planting greenery projects, especially trees and shrubs planting, as well as the creation of green and blue infrastructure (e.g., parks, green courtyards, squares, pocket parks). These activities contribute to the quality of biologically active surfaces, increasing water retention, regulating temperature and humidity in their vicinity, and protecting biodiversity (Gómez-Baggethun, Barton, 2013). This is particularly important in the context of climate threats indicated in the Adaptation Plan and also in line with the city's policy, placing more emphasis on the development of green areas.

Considering the above, it seems to be necessary to establish criteria for assessing projects for WPB not only in terms of their compatibility with the city's policies and documents, but also in terms of contribution to the development of urban climate resilience. For example, one of the criteria could concern aspects related to rainwater retention at the place of precipitation. This would contribute to the reduction of sealed surfaces used in the city, among others, in the construction of bicycle paths, parking spaces, playgrounds, etc. and strengthens the natural capital and urban climate resilience, even as a side-effect of achieving other aims. Among other actions, the creation of such assessment criteria can also have an educational dimension to support public awareness and the importance of the natural capital and climate resilience. A further step in research can be an analysis and assessment of monetary benefits of the projects, as valuation of ecosystem services may be useful in developing policy as well as project assessment indicators.

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