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ID 1634 | A LAND CAPACITY ANALYSIS METHOD USING GIS TOOLS, AS EXEMPLIFIED BY THE CITY OF WARSAW, POLAND

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1 INTRODUCTION

The generation of forecasts regarding the further physical development of urbanised areas is a key part of spatial planning, and indeed integrated planning as conceived more broadly. A key role in the process is played by land capacity analysis, which permits both an assessment of the current state of utilisation and management of an area and the possibilities for development – by transformation or augmentation or else the de novo designation of land for building; along with indications as to how that land may be used. Further upgrading of methods by which to analyse land capacity can thus be seen as a priority where the improvement of planning methodology is concerned.

According to Kotarbiński [1973], a method is a planner's way of pursuing a complex task that entails a defined selection and juxtaposition or configuration of component activities that seek to bring about a single, identified objective, while at the same time being suitable for multiple (repeat) use.

However, the methodological issues actually representing such a key aspect in effective urban planning (here conceived of as an inherent feature of the process by which development is managed) are only taken up very rarely in Poland, and if they are – this is mostly as some kind of side issue. It is now ever-more typical to see authors [like Markowski 2010] espousing the idea that post-1990 Poland has experienced regress ("gone backwards") when it comes to urban-planning methodology. In this, it is also worth recalling how the output from Polish urban-planning thought is seen to include many examples of applied methods that have now passed into history. To be included among these is the threshold analysis method after Stanisław Malisz[1], as well as the "Warsaw Optimisation" method[2] after Kolipiński [2016].

Among many other things, Poland's first steps along the path to socio-political and economic reform entailed work to change the planning system. In the event, the changes were so far-reaching that they went hand in hand with a severing of continuity in virtually every aspect of urban planning, up to and including the methodological [Jędraszko 2005]. A conviction becoming widespread at that point was that physical development plans needed to minimise limits and curbs on possible development of given areas of land. In practice, that translated into local authorities (at the level of the Polish gmina) earmarking as potential building land as many sites as possible, effectively almost wherever natural conditions and the rigours of the law allow for it.

Thus, among the land that gmina-level Studies and Local Plans indicate as suitable – and even designate – for building, only a part is land in which the planning designation reflects any real or distinct market need, e.g. as reflected in rapid commencement of real-life construction work. Many other areas have gained designations as "for building" more or less "at the request" of owners of land, who see here a kind of future financial security, or else gain a regular income in the here and now by selling off parts of their estates piece by piece. This in turn denotes the appearance of exceptionally diffuse built-up areas, often coming into existence site-by-site, and in essence at chance (rather than thought-out) locations. In essence, this very specific view of "social justice" espoused at gmina level is allowing as many owners of land as possible to engage in construction work if they so wish, under conditions that are more or less similar, averaged out and so – in some conventional and oversimplified understanding of the term – "just" [Solarek 2013].

The further consequence of this approach is the disappearance from each plan of what should be – and once was – its most fundamental premise, objectively-defined need as regards development, translating into the goal or objective of the plan itself, as a whole. What this has denoted is activity to negate the sense behind the application (as in the past) of what are now defined, or dismissed as "traditional" methods of drawing up plans (i.e. with a clearly pejorative flavour now being attached to the word "traditional"). This thus represented an almost total severing of previously-existing ties between theory and practice [Zuziak 2005].

Against such a background, it becomes hugely important for local authorities to define the actual needs of given settlement units as regards development, taking real demographic processes and economic potential into account. The aforesaid huge surplus of land designated for building in gmina-level Studies and Local Plans is giving rise to irrational use and management of land, while also having hugely negative financial consequences for local authorities. And the scale of the phenomenon indicates the lack of methodological rationality characterising today's urban planning in Poland – a problem that professionals began to take note of some years ago now [e.g. Izdebski et al. 2007, Solarek 2005, Kowalewski 2013],

[1] A tool for selected strategic directions to a city's development in relations to defined time sequences. This entails the identification of limitations and thresholds relating to development which can only be overcome if disproportionately high costs – as set against the number of new inhabitants - are incurred.

[2] This is set to select what would be socioeconomically the most favourable variant for the distribution of an anticipated programme of new development across space. It entails analysis of costs of implementation of the said development, with these arising out of natural features of the land concerned, as well as locations in respect of source elements of technical infrastruture.

and one now finding its reflection in domestic law, with 2015 amendments to Poland's Planning and Physical Development Act finally generating a requirement that a series of spatial analyses be carried out for both urban and rural areas [Ustawa o planowaniu… 2003].

In accordance with the regulations now in force, the so-called "Study on Physical Development Conditions and Directions" inter alia takes account of conditioning arising out of the balance of land designated for building. Also laid down is the required scope of research necessary as such sites are demarcated. Among other things, there is a requirement that capacity be assessed as regards: "areas located on the territory of a given gmina supporting a fully-developed and contiguous functional and spatial structure within the boundaries of a settlement unit (…)", with this therefore being considered utilisable area within buildings and/or already-utilised built-up land, in which there is also an assignment of functions. Further: "estimates shall be made of the capacity of land within a given gmina designated for building in Local Plans (…), as expressed in terms of the area of utilisable building land, with a division into functions".

The results of the analyses of this kind, as combined with demographic forecasts, are compared with and set against a given gmina's financial and organisational capabilities. The effect of this is then an identification of land on which new construction work is actually to take place, along with indicator values for that work [Ustawa o planowaniu… 2003]. It is an obligation for local authorities to pursue such studies, but thus far methods by which they can discharge this duty efficiently and reliably have not been developed.

2 RESEARCH AIMS AND A CHARACTERISATION OF THE LAND SELECTED FOR STUDY

The aim of the research work detailed here has been to attempt to automate land capacity analysis using the GIS tools whose utilisation in planning has been increasing steadily in recent years. This is happening in line with increased quantity, quality and accessibility of spatial data that can serve as a basis for analyses suitable in assessing and forecasting development in urbanised areas, inter alia those discussed in this article. Use of the Model Builder application, which offers models for how to proceed compiled from tools available in its programming, can streamline the processes by which necessary spatial analyses are carried out, all the more so if the same procedures can then be implemented in respect of many other towns and cities. An activity pathway once put in place would then be suitable for multiple and repeat use.

The use of GIS tools is a matter already taken up by many researchers, albeit with some publications confining themselves to a very broad conceptualisation of the tool(s) [Foresman 1998, Gaździcki 1990, Eastman 2001, Litwin and Myrda 2005]. Others focus in on the use in planning [O'Looney 2000, Urbański 197, Malczewski 1999, Piwowarski 2009, Malczewski and Rinner 2015, Geertman and Stillwell 2003, Joerin et al. 2001], or devote themselves to matters of urban-planning design [Hanzl et al. 2011]. Making an occasional appearance in foreign literature are articles on capacity-limits in the environment when it comes to needs as regards the locating of new construction work and built-up areas [Senes and Toccolini 1998]. In Poland, there are just a few papers dealing with the use of GIS tools in forecasting spatial development [Parteka and Czochański 2003, Fogel 2007, 2013]. Only rather recently has it started to be seen as essential for new methods applicable to development planning to be devised [Biegański 2016].

Work detailed here has thus sought to fill a research gap as regards spatial-planning methods, with a view to a tool suitable for practical use by local authorities being proposed. An equally important objective has been the study and presentation of the current spatial structure characterising Warsaw as a city and as capital of Poland, with this not being confined to analysis of the spatial breakdown of functions set against each other, but also including an analysis of the percentage shares accounted for by different functions in delineated accounting units.

The work described here thus analysed the situation of land within the city limits of Warsaw, as the most functionally and spatially diverse urban area in Poland. The capital city is at present divided into 18 Districts characterised by varying degrees of urbanisation of their land. By reference to observations made, the areas of these Districts were further divided into accounting units, differing from one another in terms of their physical development – with, for example, one including areas in which the multi-family housing function prevails, and another being characterised by a clear prevalence of more-extensive built-up areas featuring single-family housing.

3 DESCRIPTION OF THE LAN CAPACITY RESEARCH CARRIED OUT IN WARSAW

3.1 OBTAINING DATA

The first stage to the research work described here entailed the collection of the necessary spatial data concerning the city of Warsaw. Such data were obtained from the so-called EGiB[1] base (where the abbreviation for Ewidencja Gruntów i Budynków denotes registration of plots of land and buildings). These are vectoral spatial data that include, not only the geometry of buildings, but also other attributes relating to each premises. For the purposes of displaying and analysing the data obtained, use is made of the ArcMAP program, forming part of the ArcGIS package. Data on buildings and plots are displayed as layers, along with tables of attributes. Initially, the layer with buildings contained attributes as follows, i.e. a unique code for the given building, X-Y coordinates for buildings, and area data simultaneously equivalent to the area that is built-up, but also information on numbers of floors and functions (though not in every case). The layer relating to plots in turn encompassed a unique code for the object, as well as coordinates, and information on size of the area – which is at the same time equivalent to plot area.

The existence of all of these attributes make it possible to calculate basic indices like the share of building plots that is actually built on, as well as the overall floor space accounted for by built premises[2], obtained by multiplying the area a building covers by its number of floors. In fact, these attributes do not suffice to calculate the utilisable area on premises[3], even if they do represent key data for further analyses and the obtainment of relevant results. Rather, the data actually required are obtained once relevant conversion factors have been determined and applied.

Following sub-chapters detail the process by which the necessary indices are established, along with information on their use to calculate utilisable area, with a subordination of the overall figure to different identified functions.

3.2 DATA ANALYSIS TO DETERMINE THE UTILISABLE AREA WITHIN LAND UNITS

In making an appropriate selection of conversion factors applicable to buildings, it is necessary to analyse functions and means of utilisation in detail, as well as to determine the time at which buildings came into existence. This all reflects the way in which the above features impact upon coefficient values. Residential buildings arising at different times in history differ in the form and manner of construction, ensuring that conversion factors are also different. Buildings meeting service-related, industrial or commercial functions will also be characterised by various different values for the conversion factor. To streamline the process by which functions and ages are assigned to buildings, and to take account of the marked spatial differentiation present within the Warsaw city limits, it was decided to assign the accounting units identified to different zones from the point of view of the different ways in which land is utilised. The functional zones distinguished are as detailed in the table below.

[1] EGiB – Ewidencja Gruntów i Budynków or Register of Land and Buildings – this is a land-survey-related public register featuring quantitative and descriptive data on land, buildings and premises, as well as property ownership.

[2] The overall area is the sum of all floor space on all floors of a building, obtained straightforwardly by multiplying a building's area by the number of floors.

[3] The utilisable area measures the floor space on all floors within premises that serves to meet demands associated with the assigned designation, as measured here by multiplying the overall area by an appropriate conversion factor.

Symbol	Category	Additional information
EW	Hard media services	Power supply, media and fuel, e.g. heat and power plants, areas with water pipelines, etc.
MN_0	Built-up residential areas of low-rise single-family housing	Free-standing houses, semi-detached or terraced, together with other building sometimes present on plots
MN/U	Built-up residential areas of multi-family housing plus services	Built-up residential areas where housing and premises rendering services are mixed together, as where certain old villas have been adapted to serve as Embassies or the seats of firms, also buildings in which there are service premises on the ground floor with housing functions on higher floors
MW_0	Built-up residential areas of multi-family housing	Built-up residential areas of multi-family housing either lacking services or with services hardly present – as mainly on gated housing estates
MW/U	Built-up residential areas of multi-family housing with service premises (mainly ground-floor)	Premises rendering services primarily located in the ground-floor areas of buildings and mainly on the edges of residential quarters
MW_U	Built-up residential areas of multi-family housing with services	Premises rendering services not confined to the ground floors of buildings, though mainly in buildings immediately adjacent to the unit's main streets. Present primarily in the city's Śródmieście, Wola, Ochota and Praga Południe Districts.
PR	Industry	Industrial premises
US	Depots and warehouses	Premises designated for storage, including warehouses designated for commercial functions, and not merely those serving industry's needs
PUS	Abandoned	Abandoned premises in a poor state or in ruins, uninhabitable
TR	Transport	Stations and airport terminals, Metro stations, bus and tram depots, multi-storey car parks, large concentrations of single-place garages adjacent to multi-family housing
TK	Rail transpor	Buildings on railway land and/or servicing rail transport (excluding the station premises included under the TR function)
UA	Administration and public security	Premises used in public administration, e.g. courts, Ministries, Embassies, District Offices, police stations and headquarters, buildings used by the Armed Forces, etc.
UB	Office buildings	Commercial premises, buildings within business or office parks
UF	Non-material services	Premises used by the financial and insurance services, finance centres, banks and exchanges
UH+UM	Commercial and material services	Service premises found mainly on housing estates
UI	Other services	Services not assignable to other categories referred to above
UK	Cultural and recreational services, the hotel industry and tourism	Local culture and community centres, theatres, cinemas, museums, stadia and sports halls, buildings associated with gyms and sporting premises, hotels and related premises and those associated with tourism
UO	Educational and scientific services	Creches and kindergartens, primary schools, junior high schools, high schools, establishments in higher education and scientific institutes
UU	Various services	Areas in which a variety of services are concentrated – e.g. shopping centres and malls
UZ	Health services	Hospitals, health centres, clinics, offices of specialist practitioners, first-aid rooms and other medical premises

Table 1 – Division of land into functional zones. Source: author's own elaborations

This differentiation between the functions areas serve makes possible the automatic ascribing of features to the buildings present at given sites, bearing in mind the spatial relations pertaining between areas and their buildings. The use of the spatial tools is further preceded by relevant assignment of time intervals, given the likelihood that particular points in time will be associated with a prevalence of one construction technology or another, with this in particular influencing energy-consumption features of the given buildings. Information on such features can prove valuable in various different kinds of analyses of urban areas, i.a. related to their energy needs.

Category	Justification
Pre-1981	Up to the 1982 time of introduction of the PN-82/B-02020 thermal protection standards
1982-1991	Up to the 1991 time of introduction of the PN-91/B-02020 thermal protection standards
1992-2001	Up to the time of introduction of the E0 value describing energy consumption
Post-2002	Binding limit values for energy consumption, wide application of layered walls and development of insulation technologies
BD	No data – applied to buildings for which no data on age can be found
ND	Not applicable (n/a) – applied in circumstances where excessive diversity made an age determination impossible, e.g. where there are aggregations of single-family housing in built-up areas, but also where the information in question is not critical, as with warehouses and stores, as well as construction of a temporary nature

Table 2 – Categorisation of buildings in line with time of construction, given
the influence on energy-consumption attributes. Source: authors' own elaboration

Supplemented in this way, the tables of attributes were used in statistical compilations concerning land utilisation within the Warsaw city limits, with a division into Districts, and beyond that into the designated accounting units. As the databases arising in this way included large numbers of these, the decision was taken to return to calculations based around Districts. This was associated with a repetition of successive steps in the case of each District. Through ArcGIS programming a model by which different tasks could be carried out in a defined order with the aid of simple tools was developed. This could then be applied successively to Warsaw's 18 different Districts, the use of the action model allowing the necessary activities to be proceeded with much more rapidly than would be the case were separate operations to be carried out.

Conversion factors allowing for the shift from overall area to utilisable area were brought together in a table later combined by relationships with the layer containing buildings. Merging was achieved using appropriate Standard Query Language queries. Utilised conversion factors are as presented below.

Type of building/premises	Time of origin	PU coefficient
MW	Old Town built-up area	0.69
	19th-century tenement buildings	0.75
	so-called "large-panel" construction	0.79
	1992-2001	0.83
	Post-2002	0.85
MN	n/a	0.7
P – halls and production-related	n/a	0.97
U – service premises	Pre-1992	0.8
U – offices, services and high-rise buildings	Post-1992	0.9
Farm or utility buildings	n/a	0.8

Table 3 – Indices used in calculating PU in relation to building ages and technologies.
Source: authors' own elaborations

Presented below is a schematic representation of the action model created for the needs of the research using the Model Builder application, which is used to create, edit and manage models for data flow between geoprocessing tools. A further aspect here is that results may serve as input data to be used by other tools.

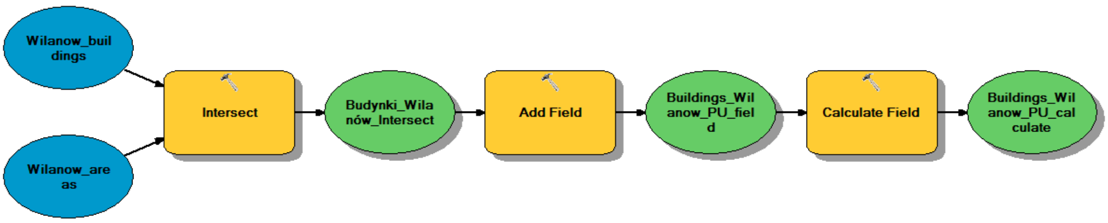

Fig. 1. The action model meeting the needs of the research conducted, under the Model Builder application.
Source: elaboration by A. M. Jachimowicz

The use of this procedural model for layers, with its spatial data relating to different Districts, allowed values for utilisable area in these Districts to be obtained more rapidly. The statistical tool developed facilitates the compiling and aggregation of data, including values for such basic indicators as overall areas, lowest and highest values, mean values and standard deviations.

GIS programming not only allows for the collection, compilation and analysis of data, but also for their presentation in a user-friendly manner, in the form of maps and graphics of which examples are provided below.

Fig. 2. Distribution of built-up areas of differing functions and ages.
Source: elaboration by A. M. Jachimowicz

To achieve a transparent presentation of the obtained totals for utilisable area related to the different functions in accounting units, appropriate values need to be assigned to the latter within units. Totals for the different units are then obtained using the Intersection tool, which can designate the geometrical common part, via a kind of multiplication of the layers by themselves. The layer containing the buildings, their functions and utilised area with a division by functions is multiplied by the layer containing the accounting units. A layer with buildings is obtained in this way, along with different attributes, with the operation resulting in a location in the appropriate accounting unit. It is then necessary to carry out an aggregation of values for the utilisable areas in respect of different functions. This aggregation is made possible by the Dissolve tool allowing for the merging of objects on the basis of defined attributes – in this case in relation to function, as well as allowing for the calculation of statistics relating to the aggregated objects that arise – with further analysis making use of the function of a total. The consequence was the obtainment for each unit of a vector layer containing a number of objects that corresponds with the number of different functions present in the given accounting unit. For results obtained to be used, not only in the form of a table, but also by way of appropriate geovisualisations, use also needed to be made of Join table, which assigns totals obtained previously to relevant units.

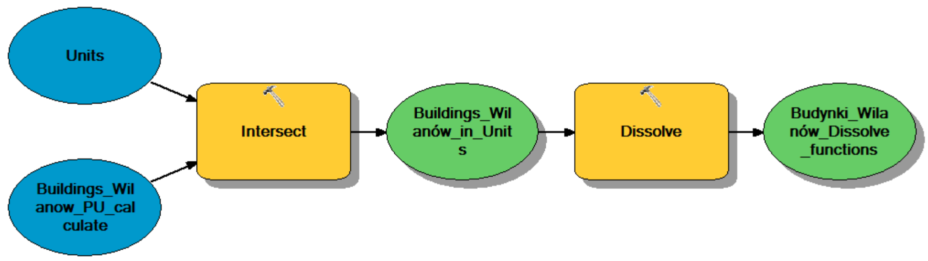

Fig. 3. Procedural diagram. Source: elaboration by A. M. Jachimowicz

Thanks to the above actions taken it inter alia became possible: (1) to use cartograms in visualising the results obtained and (2) to engage in the comparative analysis of data. An example of the use of cartograms to visualise the roles of the different functions in a given unit is given in the following figure.

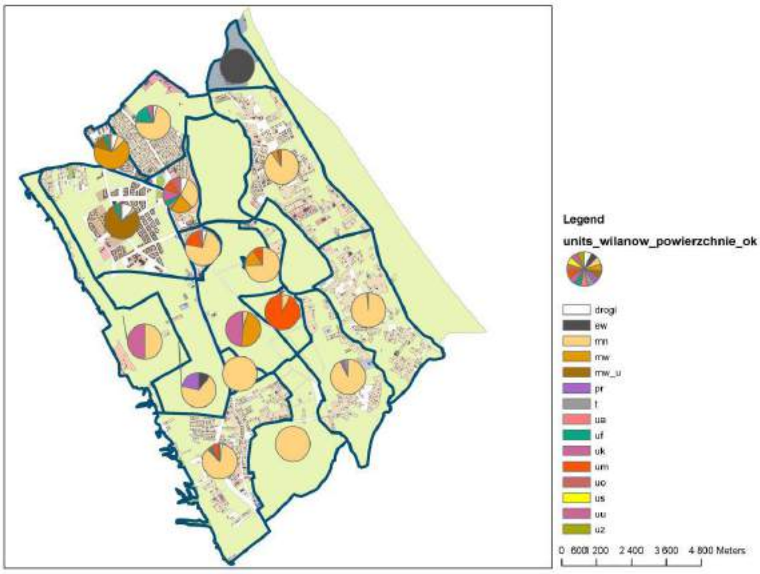

Fig. 4. Sample diagram of a District with a division into accounting units.
Source: elaboration by A. M. Jachimowicz

3.3 DATA ANLYSIS TO COMAPRE THE CURRENT INTENSITY OF DEVELOPMENT OF A BUILT-UP AREA WITH THAT PERMITTED IN THE SUIKZP[1]

The analysis involved here resembles the previous one in being carried out by reference to the spatial extents of Districts. This was again achieved by harnessing the creative possibilities of the action model, which streamlines the process by which the same kinds of analysis are pursued for consecutive Districts.

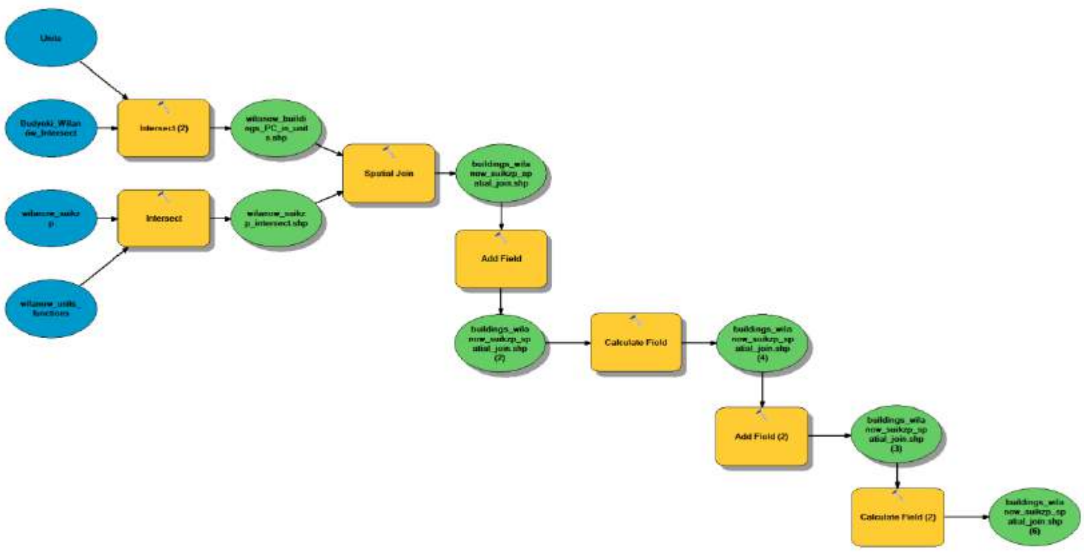

Fig. 5. Procedural diagram. Source: elaboration by A. M. Jachimowicz

The model referred to, presented above in graphic form, is described in detail in what follows. The first stage of this analytical part entails repeat application of the Intersection tool, this time in multiplying the layers with zones of management determined in the first analytical part with a layer containing a division into areas designated in the SUiKZP. This activity allows for the assignment to management zones of

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[1] The SUiKZP or Studium Uwarunkowań i Kierunków Zagospodarowania Przestrzennego is the ("Study on Physical Development Conditions and Directions") document providing mean values for the coefficient of the intensity of development into built-up areas, for land as designated in diagram form.

permitted gross values for the intensity of development in built-up areas, as designated in a Study. Subsequently, with the aid of the Spatial Join tool, it is possible to calculate the total area of all buildings located within each different zone. Following the application of this tool to the table of attributes of the layer arising, a column is added that is designed to retain values for the intensity of development indices. Calculated at this point in the management zones is the gross value of the index for the present intensity of development of the built-up area, on the basis of the formula:

Int. = GBA/Area(of plot)
where:
*BGA is the overall area with buildings = BA * NF*
BA – building area
NF – number of floors
Area (of plot) – is the area of land for which the coefficient for the intensity of development of the built-up area is being calculated

In this way, each of the management zones designated previously has a table of attributes featuring two values that relate to the intensity of development as it is at present or could be in line with what is permitted. The comparison of these values makes use of a quotient of the value for the coefficient as it is at present set against the permitted value. An extra column is thus added to store values for the quotients anticipated.

The results obtained from this activity are values across a [0; 2] interval. Values obtained for the quotient are classified in line with: present value being lower than that permitted, present value being equal or nearly equal to that permitted and present value exceeding that permitted.

3.4 RESULTS

Objectives described at the outset did prove achievable through the analysis detailed above. The methodology adopted to automate analyses and calculations showed that the application of Spatial Information System tools is particular effective as land-capacity analyses for towns and cities, or parts thereof, are carried out. Resort to Model Builder, which allows users to develop their own complex tools, facilitates the calculation process, most especially where particular operations need to be conducted in sequence for different objects. In such a case, use can be made of the iteration[1] of successive lines in the table for the layer containing the Districts making up the City of Warsaw.

The application of the aforesaid complex tools, as tailor-made using Model Builder, provides for the at-least partial automation of the analyses detailed. In consequence, a model generated one off can subsequently serve many times in calculations, as only the values for input data will change. The generation of a tool of this kind facilitates and abbreviates analyses where the necessity is to engage simultaneously with a greater number of entities, such as towns or cities or the Districts thereof.

The results of the analyses in question can be presented in various ways. The first entails the export of tables of attributes to xls files, but also to databases. The basic statistical compilations for particular layers can also be presented as a generated report containing a plot for selected data and values thereof like totals, means, minima or maxima.

Obtained results can also be visualised as maps or schematic representations. Examples of these were included in earlier chapters – a schematic representation of the distribution of a function (Fig. …), of the ages of buildings within a unit (Fig. …) or one with percentage shares of utilisable area as assigned to different identified functions.

The second analysis carried out for example provided for the identification of areas in which the quotient for current against permitted intensities of development assumes lowest values or fall within given intervals [0; 0,3]. Such low values for the quotient indicate a zone in which the current level of development is not very intensive, with land in this area capable of being designated for supplementary construction work, of course if there is no other counter-indication for that.

[1] iteration is the act of repeating (most often many times) the same instruction(s) forming part of a loop. The term is also applied to operations conducted within a loop of this kind.

4 DISCUSSION AND CONCLUSIONS

The analyses conducted allowed for determinations of percentage shares of utilisable land within given units, as broken down in relation to a variety of identified functions, and this in regard to both existing and planned physical development of the city of Warsaw.

Studies on Physical Development Conditions and Directions (SUiKZPs) designate general directions for cities' spatial development. In the case of Warsaw, the relevant document relates to the period up to 2035. This is to say that it has been drawn up in line with indicators the Study gives as permissible in the cases of the different zones. The value for overall area was to have been achieved in a period lasting approximately up to the year 2035. The largest share in this overall area is taken by built-up land serving a residential function, be this with single-family housing (in free-standing, semi-detached or terraced houses) or multi-family. By multiplying the relevant area by an appropriate proportion reflecting the way in which these two types of built-up area co-occur, and then by the conversion coefficient, it is possible to obtain the predicted 2035 figure for the area in use for single-family or multi-family housing. In turn, by comparing the anticipated area for residential use with the area currently utilised residentially, the size of the increase can also be noted. In line with the availability of land in Warsaw, the SUiKZP yields a capacity equal to around 3.5 million people. Setting the results obtained against demographic forecasts for Warsaw whose most probable scenarios assume 1.5 million inhabitants in 2050 [Śleszyński 2016], the building-land figures are markedly too high.

The analysis carried out allowed for the additional designation within Warsaw of zones that are undeveloped – as presented in Fig. 6. Consideration of the lowest figures for the quotient suggest that such units are mainly in the urban zone, or in the suburbs[1]. In the city-centre zone as such, there are only now single plots in different places that remain free of construction, with the coefficient of intensity of development for the latter now assuming values close to 0. Thanks to the results elaborated, it is also possible to offer a ratio of built-up to unutilised areas in a given District of Warsaw, or within one or other of the accounting units.

Fig. 6. Areas possible to build on them. Source: elaboration by A. M. Jachimowicz

The results obtained may serve as input data for further spatial analyses. One such analysis might involve the designation of the non-built-up areas that should be the first to commence with development. Together with the layers referred to already, layers dealing with public roads can for example be used in designating the above zones. Roads are of relevance given the way in which it is possible to determine commute times to particular parts of the city. Environmental matters are also obviously of relevance.

[1] The urban and suburban zones are two of the three that the SUiKZP identifies. The third zone is that of the inner-city sensu stricto.

While GIS instrumentation is still rarely used in the planning process in Poland, the trend for analyses of this kind is an upward one, and understandably so, given that the use of GIS can provide for the at least part-automation of the process by which land capacity is determined.

The results obtained will inform the decisionmaking process, and that shaping policy ion Warsaw's further development, while also representing input data for further spatial analyses concerning the Polish capital. The means of conducting analyses of capacity presented here can be used in practice, also of course in other cities, towns and local-authority areas.

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ID 1666 | OPERATIONAL RESEARCH IN SPATIAL PLANNING

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1 INTRODUCTION

The need to develop new methods supporting spatial planning is nowadays one of major challenges of modern urban planning. Discourse on new ways of urban management gains new meaning and is in fact a discussion about the contemporary urban planners skills and tools. The paper presents new solutions which could provide a support for coordinated, rational, and transparent decision making under conditions of risk and uncertainty. MCDA is a is a sub-discipline of operational research and was developed in 1960s in the business sector. MCDA is used in the situation of having multiple, usually conflicting, criteria and therefore has a potential for implementation in spatial planning. Some examples of using the MCDA methods for the purpose of urban management are offered. General evaluation of the proposed approach is conducted in order to identify strengths and weaknesses that could be addressed in further research. So far, it seems that bringing together economics, operational research, ICT, and applying them in the field of urban studies, could improve city policy making and urban management. It seems fair to say that urban planners might have no other choice but to look far outside their own academic discipline in search of new tools; therefore, the paper encourages a discussion on whether methods derived from operational research could be incorporated into spatial decision making process.

2 DECISION MAKING AND PLANNING PROCEDURE

In the process of urban policy making several steps can be distinguished: complex analyses are followed by formulation of a vision, mission, and main objectives, then operational tasks are identified, and finally projects/activities pursuing these goals are recognized. This procedure is connected with making up the balance of resources and time schedule of urban projects (Ossowicz 2003). Between these elements several complex interrelationships, feedbacks, and correlations could be identified. An attention should be paid to a relatively large number of bodies, institutions, and groups involved in the decision making process and the fact that the interests of these parties may sometimes be in conflict. Therefore, following issues should be taken into consideration:

- the essence of city governance: definitions (city management, city governance, spatial policy, urban policy, etc.), features of governing, city governance in the light of organization and management theory, uncertainty and risk in spatial planning;
- local government: its role and tasks, structure, features, and management instruments;