QUALITATIVE AND QUANTITATIVE ASSESSMENT OF SUSTAINABLE URBAN NEIGHBOURHOODS

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Summary

The paper discusses two methodological issues related to the evaluation of sustainable development. First, we argue for the use of urban neighbourhood as a basic spatial unit on which sustainable development should be assessed. This makes it possible to take into account characteristics that cannot be found when considering individual buildings. We understand urban neighbourhood as a physically and functionally homogenous area with similar attributes. Second, we propose to combine qualitative and quantitative techniques when evaluating the same attribute or characteristic of the neighbourhood. We claim that using both measures may improve the interpretation of data and allow us to arrive at more accurate results. The described methodology has been developed as a part of a PhD research and is used in a case study of eight neighbourhoods in Radotín municipal district of Prague.

1   Sustainable development

The settlement is considered sustainable if its social, economic and environmental subsystems are balanced [14]. Mackay [13] says that such settlements are "more likely to endure for the benefit of future generations and accommodate their needs". In order to evaluate the balance, the subsystems need to be described at certain level of detail. However, there are properties of each of these subsystems that emerge only when the subsystem reaches some "critical" size. For this reason we propose to study neighbourhoods as the basic urban unit.

Similar types of neighbourhood share many common attributes but their interpretation may differ depending on each particular case. We propose to use the synergetic effect of qualitative and quantitative methods in order to take the specific context into account.

2   Neighbourhood as an Urban Unit

The space of a settlement can be understood as an urban space and an architectural space. By the architectural space we understand the space of buildings; the urban space is the space among these buildings [17]. This division is rather theoretical because in reality both spaces are intertwined and cannot be simply separated.

By evaluating individual buildings we may miss many features which are intuitively considered as important for sustainable development. For example, the feeling of safety and place identity are typically understood as a property of an urban space. Similarly, ecological impact would be more accurately evaluated from the viewpoint of the whole area.

In order to get a more detailed description of the settlement we propose to evaluate sustainable development for larger geographical areas. In this paper we call these areas neighbourhoods. A neighbourhood is defined as a physically and functionally homogenous area of similar characteristics that exists within the settlement. An example can be a housing area in a city with a similar urban and architectural structure.

Timmermans [19] claims that if the neighbourhood analysis is to contribute to planning problems of another neighbourhood, the results must be generalisable. This involves three issues: (1) there must be a similar group of people in both neighbourhoods, (2) the characteristics discovered by the analysis must be persistent in time and (3) the physical attributes of both neighbourhoods must be similar. To summarise, the first issue we want to raise in this paper is that more accurate results can be achieved by studying neighbourhoods instead of individual buildings [10].

3   Qualitative and Quantitative Approach

As shown earlier, sustainable development is a complex concept that depends on many diverse criteria. When analysing sustainable development we need as detailed and objective assessment of the settlement as possible. There are two main approaches to the evaluation of settlements – qualitative and quantitative. We claim that informing quantitative analysis by results of qualitative assessment may significantly improve the validity of results.

Qualitative approach is used if strong hypothesis about the problem is not available. Data are typically collected by interviewing people and the findings discovered in the process can guide further investigation. Qualitative information reflects individual perception of subjects, for example the feeling of criminality/safety in the area or subjective perception of distances between places.

Quantitative approach starts with a hypothesis about the problem. The experiment is designed to confirm or refute this hypothesis. Hypotheses may include all possible types of variables: nominal (e.g. roof can be flat, gabled, shed or mansard), ordinal (e.g. flood risk can be very low, low, medium, high and very high) or interval (distance measured in length unit – meters or a number of criminal reports in the area) [8].

Evaluating the settlement has been a research topic for some time [2], [6], [7], [9], [21]. Though significant results have been achieved, there are two main reasons why their direct applicability to sustainable development has been limited. First, they do not use the same methodology and definitions of basic concepts. Different authors also understand and apply qualitative and quantitative methods in a different way. Consequently, it is difficult

to compare, contrast and reuse the results [11]. Second, the published research focused only on selected aspects of the urban space, such as accessibility [1] or community attachment [5], [6] and does not investigate multiple measures and their interrelations which is needed for assessing sustainable development.

The second issue we want to address in this paper is the role of qualitative and quantitative methods for developing more complex view on urban spaces. We propose to integrate both types of methods as the example of exploring geographic and cognitive spaces will show in the next section.

4   Geographic and cognitive space

Human activities are happening in space. For studying neighbourhoods we introduce two conceptual spaces: geographical space and cognitive space [20]. By investigating the relations between these spaces we try to understand how people perceive their neighbourhood.

Geographic space consists of physical objects, their interrelations and other characteristics, such as economic, ecologic and demographic attributes of the settlement. All attributes can be measured using "objective" methods of geometry, physics or mathematics independently of the observer. Examples of physical objects are buildings, streets, green areas or infrastructure, economic parameters might be the income, consumption of energy and other resources, examples of demographic parameters are the age and education of inhabitants or a number of reported crimes.

Cognitive space is an image of geographic space individually created by every human being. It does not preserve the relationships between objects as they are described in the geographic space. Cognition is a process in which the world gets its meaning by giving names to objects, by classifying them and constructing a system of concepts. The result of cognitive processes is a mental image of the space [16]. In a homogeneous sample of population (e.g. the same age group, sex, social and cultural background) mental images manifest common features [12].

Common cognitive patterns of a similar cultural background lead to standard interpretation of geographic space. For example many people in the USA commute every day large distances to work, whereas Europeans would find it unacceptable. Standards describe typical situations; they are widely applicable but lack details reflecting specific properties of the individual geographic space.

Qualitative analysis allows us to adapt standards to the concrete neighbourhood by taking into account the distinctive characteristics of the investigated place. Comparison of the cognitive spaces and the standards may reveal discrepancies. Further investigation discovers which attributes in both spaces are responsible for the discrepancy and may suggest new standards to be used in future investigation of the neighbourhood. Contextualised standards may result in guidelines for solving similar planning problems.

For example, in a typical Czech neighbourhood it would be acceptable to walk say 500 meters to basic services such as shops or health care. However, the respondents in qualitative analysis of a concrete neighbourhood may regard this distance too long. Further investigation may reveal that it is due to the high age of people living in the area and/or too steep terrain. The proposed solution in this case could be to improve public transport.

5   Assessing the neighbourhood

In this section we describe the process of assessing the neighbourhood by investigating its geographic and cognitive space.

5.1   Geographic Space

Geographic space of a neighbourhood is constructed as follows: first we select a settlement in which the neighbourhood resides. Then we define the neighbourhood as a part of the settlement by its physical properties. Finally we describe the neighbourhood in terms of intra-neighbourhood characteristics as well as relations to the settlement.

5.1.1 Selecting the Settlement

Every neighbourhood is framed within a settlement. The settlement provides the neighbourhood with many essential functionalities, for example shops, transport, health care, administrative services, etc. Functional and urban relations with the settlement are important part of the geographic space of the neighbourhood.

   The choice of a settlement should subscribe to the conditions specified by Timmermans [19] so that the results achieved by the analysis of one settlement can be reapplied in similar conditions.

5.1.2 Defining and Describing the Neighbourhood

A neighbourhood is defined by standard architectural and urban characteristics, such as topography, building type (individual/ housing estates), building material, time of construction, building height, roof shape, fencing, greenery or available parking.

   The geographic space of the neighbourhood is described by the above mentioned definitional architectural and urban characteristics. In addition it includes economic, ecologic and social attributes, such as number of reported crimes in the area, vandalism, energy consumption and the type of used energy or available sewage system and support for waste recycling.

   The choice of attributes can be further refined by techniques like Repertory grid [3].

Fig. 1   Examples of two neighbourhoods in Radotín: housing estates Nové Sídliště and individual terraced housing Na Benátkách

5.1.3 Neighbourhood in a Settlement

The geographic centre of the neighbourhood in the map is set as a centre of gravity of the area. It is used as a reference point for defining the position of the neighbourhood within the settlement [22]. The location of the neighbourhood in a settlement is described as the shortest walking distance [1] between the centre of the neighbourhood and selected functionalities and important natural resources (e.g. river, mountain, forest) of the settlement.

5.2   Cognitive space

Every subject constructs his/her cognitive space by selecting the functionalities and important natural or other elements that affect his/her life. These can be different shops, rivers, hills but also dumps or industrial buildings. In the next step we investigate subject's relations towards the neighbourhood and the settlement. Typical instruments are an interview or the evaluation of the nonverbal communication [15].

In the interview the respondent describes his/her perception of attributes or situations that constitute the geographic space. In addition interviews may reveal respondent's feelings such as the sense of community, place attachment, place identity, social attachment [4], [9], [18], [5] or the feeling of safety.

Using nonverbal communication approach (NCA) the investigator observes how people behave in the neighbourhood or in the settlement. In particular NCA analyses gestures, body language and general patterns of behaviour. These data may provide valuable information about the relationship between the subject, the neighbourhood and the settlement.

5.3   Analysing Geographic and Cognitive Spaces

Collected data are analysed by statistical methods to discover important dependencies between attributes of the geographic and cognitive space and to identify possible discrepancies. The goal is to identify urban elements that cause discrepancies and suggest how to fix the negative and promote the positive ones. The results are expected to be used both in urban design of new settlements and in redevelopment of existing ones.

6   Concluding remarks

The described methodology has been used in the case study in the ongoing PhD research at the Faculty of Architecture, Czech Technical University of Prague. The analysis is focused on eight neighbourhoods of the municipal district Prague 16 – Radotín. They represent two types of housing: individual and housing estates. The interviewed subjects were women aged 25-40 years with at least one child under 15 years. The goal of the research is to identify urban and architectural attributes that enhance the satisfaction of inhabitants and improve their attachment to the place. Preliminary results indicate that qualitative data provide important additional information about the geographic space.

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