Analyses of the Sustainable Patterns and Behaviours: the Case of the Residents in the Mediterranean Region of Slovenia

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Abstract

The proposed paper discusses the sustainable efficiency and quality of Slovenian neighbourhoods in the Mediterranean region of Karst[1] with the focus to the sustainability awareness and travel habits of their residents. The empirical study was carried out as an empirical pilot of the broader theoretical research project dealing with the modular urban renewal. The empirical survey (n = 112) refers to the typical patterns of behaviour, convictions and habits in relation to everyday activities condensed around the notion of dwelling and their impact on the social and natural environment. This article focuses on certain, geo-locally and thematically-referenced results brought about by the survey, with highlighted attention to the residents of the Komen municipality and their mobility patterns. The results of the survey contribute to the repository of knowledge, enlightening current trends and tendencies regarding sustainable behaviour of the residents of specific Mediterranean regions and coastal regions. From the perspective of the existing available data at the level of neighbourhoods (or similar spatial scales), the results, although thematically selective, represent a welcome contribution, not only for the evaluation of sustainable efficiency, but also in terms of the perceived quality of living by the residents of this region, their attitudes and opinions towards some of the contemporary issues in the local and temporal context.

Keywords: sustainable behaviour, neighbourhood, Karst, built environments, mobility patterns.

1 Introduction

Characteristics of built environment are important factors or make an important contribution to users' sustainable or unsustainable responses and behaviour (Williams & Dair, 2007; Shove, 2014). By the more sustainable environment we consider the environment that encourages more sustainable behavioural patterns, such as selection of the means of transport; patterns related to household provisioning and consumption; patterns related to the use of resources; attitude toward the natural and cultural living environment, and last but not least, attitude toward the neighbourhood community and participation in the broad range of its activities.

The question of behaviour of a specific community is very complex as it involves shared responsibility and actions (Niedderer et al., 2017; Lilley, 2009) that can be researched from the perspective of the individual, small communities, local authorities or different initiatives. All behaviours to some respect always reflect its socio-economic, regulative and geospatial context. This adds to the equation many variables that determine more or less beneficial final outcomes for the individual or the community; this to a large extent contributes to shaping the methods and the level of sustainable behaviour

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[1] The Karst Plateau or the Karst region (Slovene: Kras, Italian: Carso), also locally called Karst, is a karst plateau region extending across the border of southwestern Slovenia and northeastern Italy. Karst in general is a special type of landscape that is formed by the dissolution of soluble rocks, including limestone and dolomite. Karst regions contain aquifers that are capable of providing large supplies of water (The Karst Waters Institute, 2019). Johann Weikhard von Valvasor, a pioneer of the study of karst in Slovenia and a fellow of the Royal Society for Improving Natural Knowledge, London, introduced the word karst to European scholars in 1689, describing the phenomenon of underground flows of rivers in his account of Lake Cerknica.

The proposed paper discusses the sustainable efficiency and quality of Slovenian neighbourhoods in the Mediterranean region of Karst with the focus to the sustainability awareness and behaviours of their inhabitants. The empirical study was carried out as an empirical pilot of the research project dealing with the modular urban renewal. The empirical survey (n = 112) refers to the typical patterns of behaviour, convictions and habits in relation to everyday activities condensed around the notion of dwelling and their impact on the social and natural environment. This paper focuses on certain, geo-locally and thematically-referenced results brought about by the survey, with highlighted attention to the residents of the Komen municipality and their travel behaviour.

The Municipality of Komen extends on 103 square kilometres in the Karst region of Slovenia from its border with Italy and the Municipality of Duino-Aurisina up to the Branica Valley on the north edges of the region which then falls into the Vipava Valley. The area of Slovenian Karst which gave the name to the entire karst landscape is defined by the specific landscape with topographic depressions (sinkholes and caves), caused by underground solution of limestone bedrock. Profound limestone, bora wind, cave systems, poor red soil, and decreasing population are the common denominators which form the highly subtle characteristics of this area.

The highly expressed permeability of grounds results in high pollution potential. The environmental pressures of households, traffic, farming or industry are critical factors in karst terrain and the reduced opportunity for contaminants to be filtered. Together with the water, pollution – the consequence of various human activities in the sensitive karst environment – can also spread quickly and represents an increasing threat to the quality of karst waters; karst water sources represents practically the only source of drinking water (80–90%) in the area (Petric and Rubinic, 2017). Moreover, the unique combination of geomorphology, thin soil, Mediterranean and continental climate as well as historic human intervention in this area (wider area is the typical Karst terraced landscape) also represent an essential habitat for flora and fauna; the Karst region is one of Europe's richest areas in animal and vegetable species and one of the world's biotic diversity "hotspots". The described characteristics of the area make the Karst exceptionally vulnerable to human intervention and pressures; a profound awareness about the importance of the Karst natural and cultural heritage (traditional shepherds' huts, drystone walls and ponds; traditional teraces) and preservation is of huge significance including the awareness among the residents and its visitors.

2 Methodology

The empirical study of assessing sustainability awareness and behaviour of the population in Slovene towns and villages has been devised as a survey conducted in a number of Slovene neighbourhoods. The main goal was to gain insights against our hypotheses about sustainability awareness and behaviour of population in neighbourhoods in dependence of different types of living environments, geo-local context and demographic characteristics of individual researched population. In this article we focus to the population of Komen. In the analysis we look at the results against the results gained in other pilot neighbourhoods across Slovenia (referential values) where the survey was conducted. We were interested to find whether there are statistically important differences in sustainability behaviour, beliefs and habits of populations in Komen against the mean values in other Slovenian neighbourhoods.

The selection of pilot neighbourhoods was based on four key factors that ensured higher diversity of researched forms and consequently higher universality of the final instrument for evaluation of neighbourhoods in Slovenia (Verovsek et al., 2016). All neighbourhoods were selected on the basis of spatial districts and by grouping them together. Due to restrictions posed by the Statistical Office of the Republic of Slovenia (SURS) to provide probability sampling, addresses and existing data, all neighbourhoods are groupings of spatial districts that include at least 500 permanent inhabitants. In the case of Komen this means the borders of the whole settlement, hence we joined the initially split neighbourhoods into one group. Other residential neighbourhoods we use as referential values in this article for comparison are more urbanised and more densely populated. They are located within the central and western part of Slovenia respectively.

The target population of the survey were individuals older than 15 years with permanent residence in the selected neighbourhoods or settlements. In the case of Komen the sample includes all inhabitants of this settlement over the age of 15. Sampling was made on the basis of the Population Register by SURS. Our application to obtain stratified probability sampling and addresses of the target population was approved by the Data Protection Committee. The sample included 40% of randomly selected units of the target population in each neighbourhood.

The final realized sample included 321 valid units of the population above the age of 15 years with the average age of 48 years (in Komen, the average age of respondents was 43 years). At the time of participation, completed high school was the level of education for 48% of our respondents, short cycle higher education for 15% and higher education or higher for 22% of our respondents. In the population of Komen, the share of the population with high school education was somewhat lower (43%) while the share of the population with higher education or higher was slightly higher (25%). From the employment perspective, the majority of the population was employed (47%), followed by retirees (37%) and students (10%). In the case of Komen, the number of students was a bit higher (16%) and the number of retirees was lower (31%). There was a balance among the respondents in terms of gender, both in the total group and in the Komen group. Demographic-social characteristics of the collected (realised) sample show a fairly good balance in comparison with the values obtained in the target population (data by SURS, 2017). There are no statistically significant differences at the regular degree of risk or the limit of statistical characteristic between the population and the realised sample in terms of gender representation, the average age of respondents, the type of household and the average household size. Higher deviance, both in the total group and in the Komen group, was found in the age structure (Figure 1) and in the educational structure In the final group of Komen respondents, we interviewed a disproportionally high share of the older population (aged 54-65 years) and the youngest population (under 20 years). There is a poorer representation also in the educational structure: both in Komen and in other researched neighbourhoods, the educational structure is higher than in the structure of the target population. In our case the mitigating circumstance is the fact that the same discrepancy can also be found in all other researched neighbourhoods, therefore a comparative analysis does not produce any related differences.

We conducted the survey using two methods, that is, by mail (printed copy) and online (application Enka) and kept a clear separation line between the stage of contacting the sampling population and the data collection stage (Lyberg et al., 1997). Our sampling was conducted exclusively on the basis of address database in a specific geographical unit (selected neighbourhoods). In this way we obtained a quality probability sample. Each physical copy of the questionnaire sent included an invitation to provide responses online should the respondents wish to answer the questions in this way.

The questionnaire's theme is interdisciplinary, devised by the members of our project group in accordance with outcomes from a series of panel meetings. The questionnaire which includes 50 questions in five sections addresses the realisation of sustainability outcomes on different levels. The questions were restricted to a few goals only as the study of higher number of variables in one survey becomes harder due to execution restrictions, such as the questionnaire length, time needed to answer the questions, influence of participation in previous tasks, technical limitations, etc. Questions from individual sections were goal-oriented and directly or indirectly looked at the realisation of a specific goal of sustainability development. Most questions are closed-ended with the ordinal scale of values that allow for quantitative statistical analysis. There is a minor part that includes open-ended questions, either independently or as an appendix to the ordinal variables or questions.

In this article we limited the study of habits, beliefs and awareness of the population only to the selected aspects of mobility. The parameters under consideration were statistically analysed. To confirm the significance of differences among the groups we used some relevant nonparametric tests, most frequently the statistical test for homogeneity of variance (Levene's test) and two-tailed dependent t-test (characteristics level α=0.05).

3 Results and discussion

3.1 Mobility and patterns of travel

In the Mobility section of the survey we observed some aspects of sustainability patterns in the population and their views or satisfaction with services and the situation in the local environment. Sustainable mobility has some well-known objectives, such as a decrease in individualised means of transport; a balanced structure of means of transport; reduced use of fossil fuels; a combination of different means of transport; use of modern technology to manage mobility (Marshall, 2007; Holden, 2016) mainly with the aim of a better flow and access to goods, people and services; mitigation of the negative impact of transport on the environment; more energy and time efficient routes; increased safety of all members, and generally higher quality of living. Targeting strategies include direct and short-term measures to manage mobility (through built infrastructure, new transport services, regulated transport cost, etc.) as well as measures that are indirect and long-term (spatial planning of services and activities, changing the population's habits, subsidies for public transport, etc.). Related to the targets are indicators or criteria for following the progress of these strategies.

Thus, we studied some aspects of sustainable mobility patterns of the population and their views on or satisfaction with services and the situation in the local environment. They include: the number of vehicles in the respondent's household; selection of the means of transport to work/school; selection of the means of transport for errands and leisure; general level of satisfaction with conditions on the way to work/school; most disruptive elements of travel to work/school, and the amount of time spent on travel to work/school. Simultaneously we checked the actual distance between the respondent's place of residence and his workplace/school.

Hypotheses: We speculated that in smaller, less urbanised settlements outside the larger agglomerations the public transport infrastructure and services will be less developed, therefore the sustainability patterns of the population (from the mobility perspective) would be less advantageous. The second assumption revolves around Komen's geographic position and the importance of other larger settlements in its vicinity to which its inhabitants are bound. We assumed that its inhabitants are more dependent (as in the case of referential neighbourhoods) on the gravitational towns in the vicinity and thus more reliant on a larger number of trips by car while at the same time provided with fewer opportunities for walking and cycling (we took an average range that is still comfortable for the majority of the population – 1 km for walking and 5 km for cycling). Our third assumption linked the satisfaction of the population with the transport infrastructure, including stationary traffic and the sense of traffic safety. We hypothesised that neighbourhoods in more urbanised environments have better conditions for dedicated cycling routes, walkways, parking spaces (and cars in general) due to the higher critical mass of the population (Huétink et al., 2010), therefore the sense of safety would be higher. On the other hand, in smaller and less urbanised settlements with predominantly single-family housing (such as in Karst region and Komen Municipality) roads tend to be less busy and there are fewer problems with parking and general lower saturation with stagnant traffic.

The results to some extent confirmed our hypotheses. They revealed that Komen inhabitants are actually more dependent on their private means of transport. According to the Municipal Planning Document of the Komen Municipality (MPD Komen, 2018), the number of public transport lines that connect the settlement with the nearby centres is modest and the connections are not frequent. The collected data also recorded very strong employment and educational ties to places that are not in its immediate vicinity – a quarter of the population travels every day to work or school in a place that is more than 30 km away (in the case of referential neighbourhoods, only 8% of the population) while another two quarters travel to a place that is at least 15 km away (in the case of referential neighbourhoods, it is only one fifth). These results in a high level of registered vehicle ownership: on average, Komen households own at least two cars while as much as 37% of households have three cars (there are only 2% of such households in referential neighbourhoods) and only 2% of respondents said they didn't own a car (10% of the households in referential neighbourhoods). In all mentioned variables it is possible to confirm the statistically significant difference between the two groups. Thus it is not surprising that as many as three quarters (more than 74%) of Komen respondents go to work or school every day by their own car and as many as three quarters of these are the only passenger in the car. In comparison and as expected, a considerable number of commuters in referential Slovenian neighbourhoods travel to work by bus or train as there are reasonably good infrastructure and services available. Nevertheless, even here the passenger vehicle dominates: 47% of the respondents travel to work or school by car and most of them (85% of all travelling by car) are the only passenger which is, from the perspective of environment and infrastructure congestion, a typically non-sustainable pattern.

In the segment where we looked at the selected means of transport, it is interesting to compare travel to work/school with travel for the purposes of provisioning, leisure and errands (leisure travel). For Komen inhabitants there is not much difference in their selection of means of transport for trips to work/school or for leisure travel. For both types of travel they most frequently select their car (64% for trips that are not related to work/study), of these 80% are the only passenger in the vehicle. For inhabitants of referential Slovene neighbourhoods the difference in the selected means of transport for the two purposes is larger and also shows a higher occupancy of the car for leisure trips. In other Slovene neighbourhoods, non-travel/work related trips are undertaken by only 39% of the population in average; of these, nearly half carry another passenger, which generally significantly reduces traffic congestion and its effects on the environment. From this perspective Komen is less sustainably oriented. Its inhabitants very much depend on the car also in their free time and for seeking provisions. Additionally, people's habits generally contribute to higher numbers of car trips in comparison with other means of transport even when there is no rational reason for this selection. Their habits tend to change more slowly than external factors (Neal at al., 2012).

At least for car owners, Komen is relatively well connected to towns in its vicinity (MPD Komen, 2018). This explains why the level of satisfaction with road conditions is relatively high, while the main issue with travelling to work are, according to

respondents' statements, poor connections between different means of public transport or low level of intermodality. In referential neighbourhoods, on the other hand, the main cause of unhappiness are traffic jams on the roads which is well illustrated by the comparison of travel distances and the time needed to cover it. Komen inhabitants daily travel to work or school to places that are on average 31 km away and spend on average around 34 minutes on travel. The inhabitants of referential Slovene neighbourhoods, on the other hand, travel only 16 km but spend on this trip only a few minutes less than Komen inhabitants. Thus, they proportionally travel twice as slowly. The general level of satisfaction with daily trips to work/school is higher in Komen despite less choice in means of transport. This is most likely the result of the fact that, at least for car owners, Komen provides quick and good connections to towns in its vicinity and also to the capital.

Perceptions of traffic safety in the local environments were tested on the respondents who walk and cycle. Well-being and the feeling of safety while walking or cycling strongly influences the decision to use these more sustainable means of transport for shorter distances (Kerr at al., 2015) and is often linked to better conditions of the infrastructure equipment (higher number of dedicated cycling paths, higher number of pavers, higher number of roads with slowed-down traffic, etc.) The respondents returned positive feelings about their sense of safety – only 16% did not feel safe enough to walk around the settlement (looking at traffic safety only). Somewhat higher is the proportion of dissatisfaction in the case of cycling (22% of respondents dissatisfied). In comparison with averages obtained in the referential neighbourhoods, the sense of safety among non-motorised traffic participants is quite comparable, therefore this hypothesis cannot be confirmed (there are no statistically significant differences between the groups (t(204) = .26, p > .05). Even though the cycling and walking infrastructure in Komen is much worse equipped than in the referential neighbourhoods (MPD Komen, 2018) this does not seem to affect the sense of safety. The reasons for this can perhaps be found in the relatively low numbers of cyclists and walkers in Komen, and perhaps also in generally lower traffic congestion by motorised vehicles. According to the information provided by The Slovene Infrastructure Agency (2018), the values for the mean daily road traffic for specific categories per annum in Komen are at least twice lower than comparable road categories in other parts of Slovenia in general.

These results can additionally be linked to the level of satisfaction with stationary traffic. Parking in Komen neighbourhoods is not a problem according to the majority of respondents, neither from the perspective of those who park cars not from the perspective of those who may be affected by parked cars. In comparison with more densely populated neighbourhoods of reference, Komen inhabitants are more satisfied with parking capacities, either close to home (t(267) = 10.42, p < .05) or close to services (kindergarten, school, shops, etc.) in the neighbourhood (t(267) = -.607, p < .05). In Komen 22% are not satisfied with parking arrangements close to home (in referential neighbourhoods as many as 57%) and 13% are dissatisfied with parking arrangements close to services (in referential neighbourhoods 37%). Such results, at least in relation to parking close to home, are understandable considering that most Komen inhabitants live in single-family homes and provide for their own parking facilities. Over two thirds (67%) of Komen inhabitants park their car in their courtyard or in their private garage, and a further 23% in a provided car park close to home. Living in apartments and generally in more congested circumstances in referential neighbourhoods doesn't allow for such parking, therefore there is more unregulated parking (on green surfaces, on the roads, on pavers) and parking in free public areas in such neighbourhoods. Consequently, in neighbourhoods where this problem is not addressed this means lower quality of living and devaluation of free public surfaces. Hence, inhabitants of Komen are less sustainability oriented due to the higher number of passenger cars they possess, nevertheless, this is not reflected in potential traffic congestion in open public spaces.

4 Conclusion

The patterns of behaviour, peoples' habits and attitudes towards various issues condensed within the notion of dwelling are an important part of the sustainability assessment in terms of neighbourhoods and communities. The pilot study, which we have carried out and which is partly discussed in this paper, was primarily aimed at identifying the possibilities for obtaining missing data at the level of neighbourhoods and to identify the possible obstacles that are occurring in the process of assessment. From this point of view, the study was carried out on the population of spatially and socially diverse neighbourhoods in Slovenia, which further provides us with the necessary modifications in the structure of indicators in the evaluation model. In this paper, we presented some of the results of the survey study, with an emphasis on the Karst population in relation to the reference average values of the other neighbourhoods in Slovenia. The outcomes are thus a contribution to the knowledge of sustainable sustainability trends within the Karst and Coastal Region population and in relation to some of the more urbanized neighbourhoods of central Slovenia. From the perspective of existing available data at the level of neighbourhoods, the results, although thematically selective, are a welcome contribution, not only for the evaluation of sustainable efficiency, but also in terms of the quality of living of the inhabitants of these neighbourhoods.

However, the study is a pilot, which brings limitations in terms of generalizing the final results or making uncritical inferences about the impacts of the neighbourhoods' characteristics on the behaviour of its inhabitants. Despite the random character of the sample and the sufficient size of the sample population, the results do not allow for major generalizations due to insignificant number of neighbourhoods involved in the study and insufficient regional coverage within the Slovenian territory. Individual regions in Slovenia show specific characteristics which, regardless of the age, the urbanization and population density or renewal stage of the neighbourhoods, could influence the results of the behaviour patterns of their residents.

Regardless of the mentioned reservations, the results of the study give us a good track record for creating customized forms of sustainability and quality evaluation indicators, and above all a good framework for searching for their relevance. Some aspects of sustainability are more relevant in certain types of neighbourhoods, while for other types it may be completely insignificant and, in the evaluation structure, unnecessary. We are aware that both rationalization and the standardization of instruments for the assessment of neighbourhoods are essential for their operability and actual feasibility. The problem of the current assessment frameworks is not to exclude individual aspects of sustainability, rather in the inability to actually create indicators and obtain applicable input data to explain particular dimensions of sustainability. With the described pilot study we are patching this gap and, at least partly, overcoming these problems.

5 Acknowledgements

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