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# DIFFICULTIES IN OBTAINING DATA FOR THE QUALITY OF LIFE SURVEY PROCESS

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**Purpose:** The aim of this paper is to examine how municipal offices acquire data in the quality of life survey process and to highlight the difficulties that arise at this stage.
**Design/methodology/approach:** A questionnaire survey was carried out on a sample of 29 city halls of over 50,000 inhabitants located in Poland that conduct structured quality of life surveys. Information was obtained on the organization of the data collection process and the difficulties at this stage.
**Findings:** Factors that influence the correct course of the data acquisition process in quality of life surveys were identified. Particular attention was paid to the frequency of the survey, the definition of indicators and the preparation for the survey. Limitations and problems that arise at the data acquisition stage were identified. A list of six main difficulties that should be taken into account at the planning stage of a quality of life study was developed.
**Research limitations/implications**: Limitations arising from the specifics of the study are highlighted and directions for further research are suggested.
**Practical implications:** Solutions have been identified that have practical applications for municipal offices and should improve the data acquisition process.
**Social implications:** The social implications of the research have been identified. Proper data collection from residents should improve the quality of life.
**Originality/value:** The paper outlines the importance of proper data acquisition in the quality of life survey process and its impact on subsequent decision-making and action. Attention was paid to the awareness and knowledge of those responsible for conducting quality of life surveys. It analyses the problems that arise at the data acquisition stage and, on this basis, identifies a list of six basic difficulties that should be taken into account when preparing for a survey.
**Keywords:** Data collection, quality of life survey, municipal office.
**Category of the paper:** Research paper.

## 1. Introduction

Nowadays, a city can be treated as a complex system influenced by many elements and the network of relationships between them. A unit composed of many elements, functioning in a specific area, in a specific environment, should be treated as a dynamic, functional whole, i.e. a territorial social system (Chojnicki, 1988). Urban development planning requires knowledge of the individual elements of the city system and the relationships between them, and the adaptation of these assumptions to local conditions (Sneddon et al., 2006). It is therefore not possible to directly replicate solutions taken from other geographical or socio-economic realities. It is necessary to obtain information from the city level, with a particular focus on information from the residents living in the area. This is reflected in the smart city concept and definitions of the concept (Giffinger et al., 2007; Caragliu et al., 2011; Nam, Pardo, 2011; Bakici et al., 2013; Albino et al., 2015; Kubina et al., 2021; Hajek et al., 2022). The most widespread smart city model assumes that six areas are linked, identifying a number of factors in each area (Giffinger et al., 2007). The smart city concept is still evolving and in its third generation, citizens should take the initiative (Alexopoulos et al., 2019; Pira, 2021; Kubina et al., 2021). Residents should provide the information needed and be involved in the development of the city. There are different forms of resident involvement, both individual and collective. The municipal government should create the right conditions for expressing needs and expectations. It should develop methods to collect opinions and comments from citizens. Moreover, these methods should ensure that data is collected in a cyclical manner. Many authors point out the need to obtain information from different sources (Huovila et al., 2016; Bosch et al., 2017; Allam, Newman, 2018; Desdemoustier et al., 2019; Camboim et al., 2019; Jonek-Kowalska, Wolniak, 2023). Adequate acquisition of this information and, later, its proper processing should lead to specific decisions and actions. The concept of bottom-up information transfer has many proponents (Caragliu et al., 2011; Bakici et al., 2013; Albino et al., 2015; Macke et al., 2018; Kubina et al., 2021; Hajek et al., 2022). In contrast, relatively few authors highlight the difficulties and barriers associated with obtaining and processing information from citizens (De Guimarães et al., 2020; Tan, Taeihagh, 2020; Treude, 2021; Mouratidis, 2021). One method of obtaining information from citizens is through quality of life surveys. To date, these surveys have been used to assess the satisfaction of citizens and to evaluate the performance of the city government (Insch, 2010; Macke et al., 2018; Rodríguez Bolívar, 2021). In contrast, they have not been used to obtain information that can be useful for the wider development of the city (Papachristou, Rosas-Casals, 2019; Moeinaddini et al., 2020; Goerlich, Reig, 2021; Mouratidis, 2021; Przybyłowski et al., 2021). The author of the study and his research team conducted extensive research to investigate how cities understand and conduct quality of life surveys so that information useful for sustainable urban development can be extracted. Two stages of research were carried out, the first stage analysed cities that

conduct structured quality of life surveys (Ligarski, 2021; Ligarski, Wolny, 2021a, 2021b). In the second stage, a comparative study of cities with and without structured quality of life surveys was conducted (Ligarski, 2022; Ligarski, Owczarek, 2023, 2024). Based on the results obtained, it was clearly confirmed that quality of life surveys can provide information that can be used for sustainable urban development. For this to happen, however, a proper understanding and preparation of quality of life research is needed. This publication focuses on the issue of data collection in the quality of life survey process. How should the municipality organise the data collection stage so that information useful to the city can be obtained. For the purpose of this paper, some of the results obtained in the second stage of the research procedure were used.

The aim of the paper is to examine how city halls acquire data in the quality of life survey process and to highlight the difficulties that arise at this stage.

## 2. Methods

When embarking on the research, an attempt was made to cover the largest possible group of municipal offices located in Poland. Ultimately, all city offices in cities with more than 50,000 inhabitants were selected for the study. Thus, the subject of the research are 84 city offices in cities with more than 50,000 inhabitants. A research methodology was developed and hypotheses and research questions were formulated. A research tool was selected - a questionnaire survey was chosen. An original survey form was developed for the research. The form included 30 survey questions and a metric. Closed questions were used, allowing respondents to choose one or more answers, depending on the question. Some of the questions also allowed for other answers - where the respondent could formulate the answer themselves. The anonymity of the research was ensured. At no point did the cities provide information that could unambiguously indicate the name of the city. The surveys in the offices were carried out by an organisation that professionally deals with this type of activity, between November 2021 and January 2022. Out of a population of 84 offices, 80 offices responded, giving a survey return rate of 95.2%. Based on the survey results, the offices were divided into two groups. The first that conducts structured quality of life surveys (29 offices in total) and the second that does not conduct structured quality of life surveys (51 offices in total). For the purposes of this study, part of the survey results for the 29 city offices that conduct structured quality of life surveys were used.

## 3. Results

In order to examine how city halls obtain data in the process of quality of life surveys, we started by determining the frequency of the survey. The answers to the question of how often surveys are conducted in a city are summarised in Table 1.

**Table 1.**
*Overview of responses to the survey frequency question*

| Content of the question | Answers | Number of responses | Percentage % | Additional answers – number of indications |
|---|---|---|---|---|
| How often are quality of life surveys conducted? N = 29 | a. annually | 10 | 34.5 | |
| | b. more frequently than annually | 0 | 0 | |
| | c. every two years | 12 | 41.4 | |
| | d. every three years | 2 | 6.9 | |
| | e. less frequently than every three years, please specify frequency of examination | 5 | 17.2 | every few years - 2<br>irregularly - 2<br>for work on strategic documents - 1 |

Source: Own study.

More than 41% of surveyed organisations report that quality of life surveys are conducted every two years. Only 34.5% of respondents indicate that surveys are conducted annually. Almost 7% of respondents declare that quality of life surveys are conducted every three years. As many as 17.2% of respondents indicate that surveys are conducted less frequently than every three years. In this group, respondents write that surveys are conducted every few years, irregularly, when strategic documents need to be developed. What picture of the frequency of surveys can be gleaned from the analysis? Quality of life surveys are conducted relatively infrequently in cities. Only 34.5 per cent of respondents declare that surveys are conducted annually. Taking into account the fact that none of the surveyed authorities declared surveys more often than annually, it seems that conducting surveys once a year should be the optimal solution. The city council receives cyclical information on the quality of life in the city and, once it has been properly processed, can use it to make decisions and take action. A period of one year should be sufficient to capture the changes taking place and the perception of phenomena as perceived by the inhabitants of a given community. The Authority thus obtains up-to-date information and is able to follow the phenomena taking place in the city. A quality of life survey conducted every two years may not be sufficient. The city will obtain information too infrequently and will not be able to react to emerging phenomena on an ongoing basis. The passage of two years will result in some data being provided with a long delay and there may no longer be a chance for an appropriate response from the authority. People who participated in the survey without seeing a response to the issues they reported may become discouraged and not participate in the survey in the future. Cities that conduct surveys every three years or less are even worse off. The Authority receives random data from which it will be difficult to obtain reasonable information. The cyclical nature of the provision of information

and the ability to respond to emerging phenomena is disrupted. Thus, the frequency of the quality of life survey has a strong impact on the amount, type and timeliness of the data collected.

The second question surveyed was whether cities specify quality of life indicators in their surveys. Table 2 summarises the answers to the question regarding the definition of indicators, their number and types.

**Table 2.**
*Overview of responses to questions on indicators, their number and types*

| Content of the question | Answers | Number of responses | Percentage % | Additional answers – number of indications |
|---|---|---|---|---|
| Have quality of life indicators been identified for your city? N = 29 | a. yes | 17 | 58.6 | |
| | b. no | 12 | 41.4 | |
| What number of quality of life indicators have been identified in your city? N = 17 | a. under 3 | 0 | 0 | |
| | b. between 4 and 6 | 0 | 0 | |
| | c. between 7 and 10 | 2 | 11.8 | |
| | d. between 11 and 20 | 2 | 11.8 | |
| | e. between 21 and 40 | 7 | 41.1 | |
| | f. between 41 and 100 | 6 | 35.3 | |
| | g. more than 101 | 0 | 0 | |
| What kind of indicators are these? N = 17 | a. there are indicators but they are not divided into groups | 10 | 58.8 | |
| | b. indicators are divided into soft and hard indicators | 0 | 0 | |
| | c. indicators are divided into objective and subjective | 2 | 11.8 | |
| | d. indicators are divided into simple and integrated | 2 | 11.8 | |
| | e. other, please specify? | 3 | 17.6 | indicators correspond to those adopted in the city development strategy - 3 |

Source: Own study.

58.6% of the surveyed organisations define quality of life indicators and 41.4% do not define any indicators. Defining indicators should make it easier to carry out quality of life surveys and to compare results between survey cycles. Indicators define certain measures, allow certain phenomena to be described. If a city decides to develop indicators, it should analyse the phenomena that occur in it. An appropriate selection of indicators should provide comprehensive information on important phenomena occurring at the city level. Defining indicators is a form of preparation for data collection. If the city defines the indicators for the survey well, it will be able to collect more useful data. It will also be easier to compare the information obtained in subsequent survey cycles. In the organisations surveyed, 58.6% of the cities are developing indicators so they are preparing for data collection. Another issue is determining the number of indicators and the types of indicators. 41.6% of the surveyed cities

do not develop indicators. This does not mean that these cities do not prepare for data collection. There are different ways to collect data and different ways to prepare for data collection. However, the lack of indicators can be a hindrance to data collection and comparison. Seventeen of the twenty-nine cities have defined quality of life indicators. The number of indicators adopted by each city was determined (Table 2). 41.1% of the cities surveyed indicated a number of indicators in the range from 21 to 40 and 35.3% of those surveyed in the range from 41 to 100. Two cities each indicated a range from 7 to 10 and a range from 11 to 20. None of the cities indicated single indicators. The vast majority of cities chose a larger number of indicators. Describing a larger number of indicators should provide more data. Limiting the number of indicators to a small number will require selective selection of issues for analysis. It is difficult to determine what the optimal number of indicators should be. Each city chooses a given number of indicators after analysing the issues it wants to take into account. This is also evidence of preparation for data collection. If this process has been properly carried out, the city should obtain the necessary data for further analysis. The final issue is to determine the type of indicators (Table 2). Most cities (58.8%) do not divide indicators into groups. Two cities each divide the indicators into objective and subjective or simple and integrated. Three cities use a different division, dividing the indicators in such a way that they correspond to the indicators adopted in the city development strategy. In this case, too, it is difficult to speak of a standard way of proceeding. The cities decide individually whether to divide the indicators into groups or not. Either approach can be considered appropriate, provided it is based on a rational assessment of the indicators at hand. Any grouping of indicators can provide the organisation with additional information and allow for grouping of data.

The third question examined was how cities prepare for data collection in terms of the subsequent use of the information. A summary of the answers to the question of whether, when starting to collect quality-of-life data, the person in charge of the research knows what the information will be used for in the future and which organisational units it should go to is summarised in Table 3.

**Table 3.**
*Overview of responses to the question on preparation for data collection*

| Content of the question | Answers | Number of responses | Percentage % |
|---|---|---|---|
| When you start collecting quality of life data, do you know for what purposes the information will be used in the future and to which organizational units it should go? N = 29 | a. definitely no | 0 | 0 |
| | b. rather no | 1 | 3.5 |
| | c. neither yes nor no | 1 | 3.5 |
| | d. rather yes | 18 | 62 |
| | e. definitely yes | 9 | 31 |

Source: Own study.

Only 31% of respondents answered definitely yes to this question. This means that only one third of the surveyed cities, when preparing to collect data, know exactly what the information obtained from the quality of life survey will be used for in the future. They clearly know the goals of data collection and are aware of which organisational units the processed data should go to. With such knowledge, one can properly prepare for data collection. Identify the issues that should be investigated and refine the questions that will enable the necessary data to be obtained. A data collection preparation process organised in this way should ensure that sufficient data is obtained. This data, when properly processed in the future, should lead to useful information to be used for decision-making and action. The remaining cities declare problems with the preparation for data collection. 62% of the respondents answered rather yes to the question posed. How to interpret such answers? Are cities only partially aware of the purposes of data collection? Do they not fully know which organisational units the processed data should go to? This type of answer contains uncertainty, lack of conviction, doubts. The person in charge of conducting the research does not have full knowledge of what the data will be used for and where it should go. Without such knowledge, it will be difficult for her to prepare for data collection. If he or she makes mistakes or is negligent, it may lead to a situation of obtaining random data from which it will be difficult to obtain the necessary information later. Two of the surveyed cities did not answer affirmatively to the question posed. That is, they declare that when starting to collect data they do not know for what purposes the information is to be used in the future and which organisational units it should go to. If they do not have such knowledge, they will not be able to properly prepare for data collection.

The fourth issue surveyed was to identify what could be improved in data collection. A summary of the responses to the question of what, in the opinion of those responsible for conducting quality of life surveys, could be improved when collecting data is summarised in Table 4.

**Table 4.**
*Overview of responses to the question on opportunities for improvement in data collection*

| Content of the question | Answers | Number of responses | Percentage % | Additional answers – number of indications |
|---|---|---|---|---|
| What do you think could be improved in the collection of data on the quality of life in your city? N = 29 | a. there is no need for improvement as everything works fine | 4 | 6.8 | |
| | b. clearly define what data is needed | 11 | 18.6 | |
| | c. specify the purposes for which the data will be used | 6 | 10.2 | |
| | d. determine which organisational units and posts the data should reach | 4 | 6.8 | |
| | e. better prepare the data collection process | 13 | 22 | |
| | f. train staff in the purpose and methods of data collection | 10 | 16.9 | |

Cont. table 4.

| | | | | |
|---|---|---|---|---|
| | g. hold meetings with the authority's management to explain the purpose and methods of data collection | 8 | 13.6 | |
| | h. other, please specify? | 3 | 5.1 | simplify the survey - 1<br>select a company to carry out the survey - 1<br>attempt to develop the survey methodology and questionnaire together with other cities - 1 |

Source: Own study.

In this question, respondents were given the opportunity to select multiple answers. A total of 59 responses were obtained, which shows that respondents tended to indicate several answers. From this, it can be concluded that those responsible for conducting quality of life surveys are aware of the need for change and improvement in the data collection process. Only in 6.8% of the indications it was stated that everything works well and there is no need for improvement. Thus, in a very small number of offices, the data collection process is declared to be functioning properly. In the remaining offices, various difficulties arise at this stage and the investigators try to point out specific solutions that should improve the situation. The most frequently indicated solution (22%) is the recommendation to better prepare the data collection process. The preparation of this process has a decisive impact on the quantity and quality of the data collected. A well-prepared process should allow useful data to be obtained, whereas a poorly prepared process can lead to random data. Thus, if the city does not prepare the process properly, the needed data may not be obtained. The lack or scarcity of needed data will cause serious disruption downstream and necessary decisions and actions may not be taken. The second most frequent answer (18.6%) is to be clear about what data is needed. An authority embarking on a quality of life survey should clearly state what data will be collected and what it is to be used for. If such information is not available, random data not relevant to the authority may be collected. There is a danger here of conducting research for research's sake. Without knowing what data is needed, random data is acquired. Analysis of random data will not lead to useful information. The Authority conducts research but does not obtain the information it needs. The third most common answer (16.9%) is to train staff on the purpose and methods of data collection. The Authority is responsible for preparing the staff who will conduct the quality of life surveys. These people are supposed to understand the purpose of the surveys and know the methods of data collection. If they do not have this awareness and knowledge it will be difficult for them to carry out their tasks properly and this will affect the results of their work. Another indication (13.6%) seems particularly interesting.

It is postulated that a meeting should be organised with the management of the office to explain the purpose and methods of data collection. Preparation for data collection is not only reserved for those who are directly responsible for and implement the process. The top

management of the office should be involved in the process. Firstly to draw attention to the importance of the process and the data collected in it. Secondly, to explain the purpose and process of the process. And thirdly to show that the data obtained, once properly processed, will be used for decision-making by the authority's management. Such an approach should ensure that the quality of life survey has the right prominence in the office and allows the needed communication between the different parties involved in the process. Another indication (10.2%) calls for defining what the data will be used for. In order to define the data well, it is necessary to clearly indicate for which purposes it will be used. These purposes are to be known by those who prepare the data. The next indication (6.8%) is related to the previous one. It is proposed to specify to which organisational units and positions the data should reach. When preparing the data, the employee should be aware of which locations and positions the data should ultimately reach. Knowing at the stage of data preparation what the data is supposed to do and where it is supposed to go should help to better select issues and refine questions. In the question analysed, respondents were given the opportunity to formulate their own answer in the other section (5.1%). There were three suggestions here as to what could be improved in data collection. The first - to simplify the survey, where it is really a matter of clearly identifying the data that is needed and possibly removing redundant questions. The second - make the choice of company to carry out the survey. Here comes the idea of engaging an external organisation to help prepare for the data collection and then carry out the survey itself. Third - try to develop the methodology and questionnaire of the survey together with other cities. The idea is to cooperate with other cities during the preparation phase of data collection to ensure an exchange of experience and mutual assistance.

## 4. Discussion

The research carried out provided a great deal of information on data collection in the quality of life research process. The important issues at this stage have been identified and reference has been made to the perception of the phenomena taking place here from the perspective of those responsible for conducting the research. By relating the research results obtained to other publications, several regularities can be identified. Many publications highlight the need to obtain information from residents from a variety of sources (Bosch et al., 2017; Allam, Newman, 2018; Desdemoustier et al., 2019). Quality of life surveys can provide valuable information that, when properly processed, can be used for sustainable urban development (Ligarski, Wolny, 2021b; Ligarski, Owczarek, 2024). A prerequisite for obtaining useful information is the proper organisation and preparation of the data acquisition process, which is also confirmed by other publications (Kaklauskas et al., 2018; Macke et al., 2018). The results obtained highlight the limitations and problems associated with obtaining data from

residents, which is in line with the findings of other studies (De Guimarães et al., 2020; Tan, Taeihagh, 2020; Treude, 2021). As a result of the research, it was possible to obtain information on the knowledge and awareness of those responsible for conducting research. Based on the analysis of the research results obtained, an attempt can be made to formulate potential difficulties that may arise in any city office:

1. The involvement of the office management in the data collection process.
2. Selection of an appropriate survey frequency.
3. Selection of indicators and determination of their number.
4. Preparation for data collection.
5. Clearly define what data is needed.
6. Training of staff on the purpose and methods of data collection.

Awareness of these difficulties should make the office better prepared to conduct quality of life surveys and prevent problems from arising at this stage. The involvement of the authority's management seems crucial. It is the management that takes responsibility for the entire data collection process. It defines the aims and objectives of the research to be carried out and identifies the people responsible for the process. The second issue is the appropriate selection of the frequency of the surveys. The survey should be conducted at such a frequency as to obtain the necessary and up-to-date data. In order to gather the necessary information, it is useful to define indicators. These indicators should describe the issues to be surveyed in a way that is understandable to the residents. It is also important to select an appropriate number of indicators to ensure that all issues are addressed. In order to carry out the data collection process properly, good preparation is needed. When starting to collect data, it is necessary to clearly define what data will be needed and for which purposes it will be used. In order for the data collection process to be carried out properly, it is necessary to train staff on the purpose and methods of data collection. In conclusion, a recommendation can be offered to those responsible for conducting quality of life surveys:

1. Inform and cooperate with the municipal management at the survey planning stage.
2. Conduct quality of life surveys annually.
3. When preparing the surveys, identify the indicators and adapt the number of indicators to the needs of the municipality.
4. Prepare for each survey cycle.
5. Clearly define the data needed.
6. Organise training for staff on the objectives and methods of data collection.

## 5. Summary

The survey research carried out on a sample of 29 cities that conduct structured quality of life surveys provided interesting information on data acquisition. City halls conduct surveys with varying frequency. The frequency of surveys has a significant impact on the quantity and quality of data obtained. It seems that the solution to ensure access to an adequate database is to conduct quality of life surveys annually. Authorities that conduct surveys less frequently are themselves condemned to a shortage of the necessary data. In most surveyed cities, quality-of-life indicators are defined and a number of them are selected. Sometimes indicators are divided into groups. The definition of indicators is a form of preparation for data collection. If a city has indicators, in a reasonable number, it will be easier for it to collect the necessary information and compare them in subsequent survey cycles. In the research conducted, attention was paid to the awareness and knowledge of those responsible for conducting quality of life surveys. The majority of those surveyed did not explicitly confirm that, when embarking on data collection, they know for what purposes the information will be used in the future and to which organisational units it should go. This raises the issue of inadequate preparation for data collection. If the person entering the survey does not have the necessary knowledge, it will be difficult for him or her to properly prepare for the survey and identify the issues that should be investigated. This, in turn, may lead to a failure to obtain the needed data. The research found that those responsible for conducting quality of life surveys are aware of the need for change and improvement in the data collection process. They most often indicate the need to better prepare the process and to be clear about what data is needed. They call for training of staff on the purpose and methods of data collection and involvement of the office management in the preparation for the surveys. They also draw attention to defining for which purposes the data will be used and to which organisational units and positions the data should reach. On this basis, it can be concluded that there are problems in the offices related to the proper acquisition of data. These problems are noticed by those appointed to conduct quality of life surveys and these people are able to propose measures aimed at removing these problems.

The research results obtained highlight the limitations and problems associated with obtaining data from residents. By analysing the results of the research, it has been possible to identify a list of six basic difficulties that should be taken into account at the planning and preparation stage of data collection in each town hall. Recognising these difficulties provides an opportunity to better organise the data collection process and prevent problems from arising in the process. Good preparation for data collection should result in an adequate amount of useful data. The municipality will then have data which, when properly analysed, can be used to make decisions and take action.

Finally, it is important to signal the limitations of the research. A survey was conducted on a sample of people responsible for conducting quality of life surveys. Thus, the persons surveyed were designated persons who represent the respective city council. It seems advisable to carry out further surveys in the offices. Surveys of city department heads have been planned and this should provide complementary information.

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## References

1. Albino, V., Berardi, U., Dangelico, R.M. (2015). Smart cities: Definitions, dimensions, performance, and initiatives. *Journal of Urban Technology, 22(1)*, 3-21.
2. Alexopoulos, C., Pereira, G.V., Charalabidis, Y., Madrid, L. (2019). *A taxonomy of smart cities initiatives*. Proceedings of the 12th international conference on theory and practice of electronic governance. Melbourne, Australia, 281-290.
3. Allam, Z., Newman, P. (2018). Redefining the Smart City: Culture, Metabolism and Governance. *Smart Cities, 1(1)*, 4-25.
4. Bakici, T., Almirall, E., Wareham, J. (2013). A smart city initiative: the case of Barcelona. *Journal of the Knowledge Economy, 4(2)*, 135-148.
5. Bosch, P., Jongeneel, S., Neumann H.-M., Branislav I., Huovila, A., Airaksinen M., Pinto-Seppä, I. (2017). Recommendations for a Smart City index, *CITY keys - Smart city performance measurement framework*. DOI: 10.13140/RG.2.2.20190.74562 [Online], 17 Dec. 2024.
6. Camboim, G.F., Zawislak, P.A., Pufal, N.A. (2019). Driving elements to make cities smarter: Evidences from European projects. *Technological Forecasting and Social Change, 142*, 154-167.
7. Caragliu, A., Del Bo, Ch., Nijkamp, P. (2011). Smart Cities in Europe. *Journal of Urban Technology, 18(2)*, 65-82.
8. Chojnicki, Z. (1988). Koncepcja terytorialnego systemu społecznego [A concept of a territorial social system]. *Przegląd Geogr., 60*, 491-510.
9. De Guimarães, J.C.F., Severo, E.A., Júnior, L.A.F., Da Costa, W.P.L.B., Salmoria, F.T. (2020). Governance and quality of life in Smart Cities: Towards sustainable development

goals. *Journal of Cleaner Production, 253*, 119926. https://doi.org/10.1016/j.jclepro.2019.119926.

10. Desdemoustier, J., Crutzen, N., Giffinger, R. (2019). Municipalities' understanding of the smart city concept: An exploratory analysis in Belgium. *Technological Forecasting and Social Change, 142*, 129-141.
11. Giffinger, R., Fertner, C., Kramar, H., Kramar, H., Kalasek, R., Pichler-Milanovic, N., Meijers, E. (2007). *Smart Cities. Ranking of European medium-sized cities.* Centre for Regional Science, Vienna University of Technology. http://www.smart-cities.eu/download/smart_cities_final_report.pdf [Online], 17 Dec. 2024.
12. Goerlich, F.J., Reig, E. (2021). Quality of life ranking of Spanish cities: A non-compensatory approach. *Cities, 109*, https://doi.org/10.1016/j.cities.2020.102979.
13. Hajek, P., Youssef, A., Hajkova, V. (2022). Recent developments in smart city assessment: A bibliometric and content analysis-based literature review. *Cities,* 103709. https://doi.org/10.1016/j.cities.2022.103709.
14. Huovila, A., Penttinen, T., Airaksinen, M., Pinto-Seppä, I. & Piira, K. (2016). *Smart city performance measurement system*, Proceedings of the 41-th IAHS World Congress Sustainability Innovation for the Future, Algarve, Portugal, 13-16.
15. Insch, A. (2010). Managing residents' satisfaction with city life: Application of importance-satisfaction analysis. *Journal of Town & City Management, 1(2)*, 164-174.
16. Jonek-Kowalska, I., Wolniak, R. (2023). *Smart Cities in Poland. Towards Sustainability and a better quality of life.* London: Routledge, DOI:10.4324/9781003358190.
17. Kaklauskas, A., Zavadskas, E.K., Radzeviciene, A., Ubarte, I., Podviezko, A., Podvezko, V., Kuzminske, A., Banaitis, A., Binkyte, A., Bucinskas, V. (2018). Quality of city life multiple criteria analysis. *Cities, 72*, 82-93.
18. Kubina, M., Sulyova, D., Vodak, J. (2021). Comparison of Smart City Standards, Implementation and Cluster Models of Cities in North America and Europe. *Sustainability, 13*, 3120, https://doi.org/10.3390/su13063120.
19. Ligarski, M.J., Owczarek, T. (2023). How Cities Study Quality of Life and Use This Information: Results of an Empirical Study. *Sustainability, 15(10)*, 8221.
20. Ligarski, M.J., Owczarek, T. (2024). Preparing Quality of Life Surveys Versus Using Information for Sustainable Development: The Example of Polish Cities. *Social Indicators Research, 173*, 765-782, https://doi.org/10.1007/s11205-024-03371-2.
21. Ligarski, M.J., Wolny, M. (2021a). *How cities aspiring to implement the smart city concept conduct research on the quality of life - development of the research concept and the first summary of results*. Proceeding of the 37th IBIMA Conference, 30-31 May 2021, Cordoba, Spain, 2780-2787.
22. Ligarski, M.J., Wolny, M. (2021b). Quality of life surveys as a method of obtaining data for sustainable city development - results of empirical research. *Energies, 14 (22)*, 1-20 (art. no. 7592).

23. Ligarski, M.J. (2021). *Using information from quality-of-life surveys for sustainable urban development - results of empirical studies*. *Innovation management and information technology impact on global economy in the era of pandemic*. Proceedings of the 37th International Business Information Management Association Conference (IBIMA), 30-31 May 2021, Cordoba, Spain, 7775-7783.
24. Ligarski, M.J. (2022). How cities measure quality of life – concept of the second stage of the research. *Sil. Univ. Technol. Sci. Pap., Organ. Manage., 161*, 97-109.
25. Macke, J., Casagrande, R.M., Sarate, J.A.R., Silva, K.A. (2018). Smart city and quality of life: Citizen perception in a Brazilian case study. *Journal of Cleaner Production, 182*, 717-726.
26. Moeinaddini, M., Asadi-Sheraki, Z., Aghaabbasi, M., Saadi, I., Zaly Shah, M., Cools, M. (2020). Applying non-parametric models to explore urban life satisfaction in European cities. *Cities, 105*, https://doi.org/10.1016/j.cities.2020.102851.
27. Mouratidis, K. (2021). Urban planning and quality of life: A review of pathways linking the built environment to subjective well-being. *Cities, 115*, https://doi.org/10.1016/j.cities.2021.103229.
28. Nam, T., Pardo, T.A. (2011). *Conceptualizing smart city with dimensions of technology, people, and institutions*. 12th Annual Int. Digital Government Research Conference: Digital Government Innovation in Challenging Times, 282-291.
29. Papachristou, I.A., Rosas-Casals, M. (2019). Cities and quality of life. Quantitative modeling of the emergence of the happiness field in urban studies. *Cities, 88*, 191-208.
30. Pira, M. (2021). A novel taxonomy of smart sustainable city indicators. *Humanities and Social Sciences Communications, 8(1)*, 1-10.
31. Przybyłowski, P., Przybyłowski, A., Kałaska, A. (2021). Utility Method as an Instrument of the Quality of Life Assessment Using the Examples of Selected European Cities. *Energies, 14(10)*, 2770; https://doi.org/10.3390/en14102770.
32. Rodríguez Bolívar, M.P. (2021). Analyzing the Influence of the Smart Dimensions on the Citizens' Quality of Life in the European Smart Cities' Context, Public Administration and Information Technology. In: E. Estevez, T.A. Pardo, H.J. Scholl (eds.), *Smart Cities and Smart Governance* (pp. 239-256).
33. Sneddon, C., Howarth, R.B., Norgaard, R.B. (2006). Sustainable development in a post-Brundtland world. *Ecol. Econ., 57*, 253-268.
34. Tan, S.Y., Taeihagh, A. (2020). Smart city governance in developing countries: A systematic literature review. *Sustainability, 12(3)*, 899.
35. Treude, M. (2021). Sustainable Smart City—Opening a Black Box. *Sustainability, 13*, 769. https://doi.org/10.3390/su13020769.