

Analysis of the Ministry of the Environment's Waste Database as a Source of Knowledge on Waste – A Case Study

Jakub Kowalski

DDK Doradztwo i Szkolenia Beata Krzos; Wroclaw University of Economics and Business

e-mail: jkowalskiue@gmail.com

ORCID: [0000-0002-8126-7553](https://orcid.org/0000-0002-8126-7553)

Grzegorz Krzos

Wroclaw University of Economics and Business

e-mail: grzegorz.krzos@ue.wroc.pl

ORCID: [0000-0001-8423-934X](https://orcid.org/0000-0001-8423-934X)

© 2023 Jakub Kowalski, Grzegorz Krzos

This work is licensed under the Creative Commons Attribution-ShareAlike 4.0 International License.

To view a copy of this license, visit <http://creativecommons.org/licenses/by-sa/4.0/>

Quote as: Kowalski, J., & Krzos, G. (2023). Analysis of the Ministry of the Environment's Waste Database as a Source of Knowledge on Waste – A Case Study. *Business Informatics. Informatyka Ekonomiczna*, 1-2(65-66), 23-32.

DOI: [10.15611/ie.2023.1-2.03](https://doi.org/10.15611/ie.2023.1-2.03)

JEL: Q53

Abstract

Aim: The purpose of this study was to assess the usefulness and adequacy of the National Waste Database of the Ministry of the Environment (BDO) as the main source of information on waste in Poland. A representative sample of entities registered in the database was analysed in terms of responses to contact attempts and declarations concerning the sale of specific waste groups relevant to a planned investment by company X (company name withheld).

Methodology: The survey was conducted using two main research methods: CATI and in-depth interview. The CATI method involved telephone contact with a representative sample of entities from the Waste Database to explore responses to contact attempts and declarations of sales of selected waste groups. The in-depth interview focused on detailed interviews with selected bidders who declared their willingness to cooperate in the supply of waste according to the research criteria.

Results: The survey showed that out of a representative sample of 148 entities registered in the National Waste Database of the Ministry of the Environment, only 65.54% responded to the attempted contact using the CATI method. Of these responses, only 3.37% of entities declared an actual willingness to sell specific groups of waste. The in-depth interview method confirmed the willingness

to cooperate with three of the five companies that declared a supply of waste. The conclusions of the survey highlight the incompleteness and the need to update data in BDO, which can lead to inefficient waste management and negative environmental and public health impacts.

Implications and recommendations: The results of the study indicate significant implications for waste management in Poland. Incomplete and insufficiently updated data in the National Waste Database of the Ministry of Environment may lead to inefficient waste management and adverse consequences for the environment and public health. It is recommended that further research be carried out to further analyse the reliability of the data contained in the BDO and its timeliness. It is also worth considering measures to increase the transparency and availability of information in the database, which would contribute to more effective waste management in Poland. Educating BDO users on the proper use of data and encouraging cooperation of all stakeholders may also contribute to building a more reliable picture of the waste management situation.

Originality/value: The originality and value of the research conducted derives from the analysis of the usefulness of the National Waste Database of the Ministry of the Environment as the main source of information on waste in Poland. The study used innovative methodological approaches such as CATI and in-depth interview to assess the reliability of the data and the adequacy of the information available in the database. In the context of waste management in Poland, our results highlight significant shortcomings in data updating and the need to increase transparency in waste management. The implications of our research point to the need for further efforts to improve data quality and availability, which can contribute to more efficient and sustainable waste management at the national level.

Keywords: waste management, National Waste Database, efficiency of waste management, transparency of information

1. Introduction

The purpose of this article is to check the usefulness and adequacy of the Waste Database as a source of knowledge about waste. Usefulness was understood as the degree to which the information units contained in the Waste Database are used for research purposes. It was subjectively defined as low, medium and high on a three-level scale of Waste Database users. The Waste Database (BDO) is defined by law as an integrated ICT system, including the Register-BDO and the record-keeping and reporting modules, implemented from January 2020. The establishment of the BDO aims to increase control over waste management, optimise reporting processes and reduce irregularities in the waste management sector (Bitkowska & Chruściel, 2020, p. 13).

The database under study is defined by the Act as follows: “the database on products and packaging and waste management (BDO) is an integrated ICT system, which includes the Register-BDO, which has been in operation since 24 January 2018. Register-BDO and the record-keeping and reporting modules, which, in accordance with the Waste Act of 14 December 2012, will be launched from January 2020.” The legislator envisaged that the establishment of the BDO, will bring the following benefits (BDO, n.d.):

- increasing control over the national waste management and ensuring the monitoring of the flow of waste streams by enabling the keeping of waste records in BDO;
- optimisation of the waste management reporting process;
- optimisation of the processes of entry into the BDO Register, updating of data and deletion of entities from the register by introducing an electronic form;
- reducing irregularities in the waste management sector.

Taking into account the fact that certain national entities are obliged to report information to BDO on their own, the authors formulated the objective of this article – to make an analysis of the Ministry of the Environment’s Waste Database as a source of knowledge about waste.

The study used a case study of company X, based in Poland, producing, among other things, interior panels, wood panels, laminate flooring. The company plans to make an investment in a state-of-the-art thermal treatment facility for waste defined by specific codes (defined in section 3). Two research methods were used for this study: CATI, i.e. a telephone interview with the respondent, where the interviewer directs the questions and records the answers using a special computer script, and an in-depth interview, involving a telephone interview with bidders who declared the possibility of selling municipal waste.

2. Literature Review

IT databases play a key role in data management all over the world (Ramakrishnan & Gehrke, 2002), including Poland. The development of technology has contributed to changes in ways of communication, and implementation of business processes (Chomiak-Orsa et al., 2013, p. 151). In the context of waste management, systems such as the Waste Data Base (BDO) in Poland are implemented to ensure better control and optimisation of reporting processes (BDO, n.d.). Similar systems exist in other European countries, as well as all over the world. For example, in France there is the Trackdéchets (Tirado et al., 2022, p. 11) system for tracking the flow of hazardous waste, and in the UK there is Electronic Duty of Care (EDoC), which enables digital management of waste records (McNeill et al., 2021, p. 2).

Globally, one of the leading systems is the Basel Convention's Control System for the Transboundary Movements of Hazardous Wastes and Their Disposal (Bullock, 1995, p. 192). This system provides tracking of international movements of hazardous wastes, which is key thing to preventing illegal dumping and minimising waste management risks.

Data quality is a fundamental element that affects the effectiveness of database management (Janicki, 2005, p. 784). The literature emphasises that data must be complete, accurate, up-to-date and consistent to be useful to users. According to Chomiak-Orsa & Martusewicz (2023, p. 3520), data quality is one of the key factors influencing environmental management and sustainable development. High data quality enables informed decision-making, reduces the risk of errors and increases trust in the system (Perechuda & Chomiak-Orsa, 2015).

In the context of BDO, data quality is crucial, as the system aims not only to collect information on waste, but also to optimise reporting processes and minimise irregularities in the waste management sector. High data quality ensures that the information is reliable and can be used for effective waste monitoring and management (Olson, 2003).

Another of the important issues related to databases is data security (Bertino & Sandhu, 2005). In the digital age, data protection is extremely important to prevent unauthorised access, manipulation or loss of data (D. E. Denning & P. J. Denning, 1979, p. 227). In the context of waste databases, a security breach could lead to serious consequences, such as illegal dumping of waste or falsification of reporting data (Okman et al., 2011).

Another important issue is the interoperability of systems (Connolly & Begg, 2024). In many cases, different information systems need to work together in order to exchange data smoothly and efficiently. In the context of waste management, interoperability between national and international systems can significantly improve waste management and tracking processes.

Finally, attention should be paid to end-user issues. Information systems, such as waste databases, should be designed with their users in mind to be intuitive and easy to use¹⁶. A highly intuitive system increases its acceptance and effectiveness (Chomiak-Orsa et al., 2023), which is important for achieving the intended waste management objectives.

Research on the effectiveness and usefulness of databases is currently the subject of numerous analyses and evaluations in the scientific literature. These studies often highlight the challenges of information updating, data transparency and completeness (Al-Dmour et al., 2023).

3. Methodology

The purpose of this study is to test the usefulness and adequacy of the Waste Database as a source of waste knowledge. For this purpose, a Case Study of Company X (company name withheld), which is looking for waste with specific codes for a planned investment in Poland, was carried out.

In order to achieve this objective, the following research questions were formulated:

- How many percent of the subjects responded to contact from the interviewer, either by telephone or e-mail?
- How many percent of the entities that responded to the contact attempt declared a supply of waste from the groups surveyed?
- What additional information did the in-depth interview provide?

Two research methods were used in this study: CATI and in-depth interview (see Figure 1).

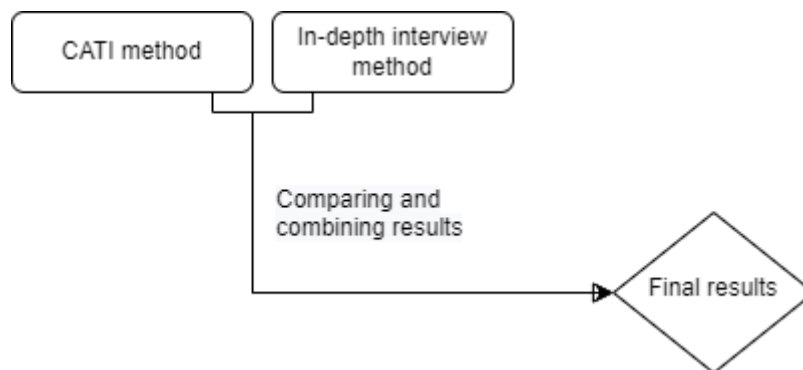


Figure 1. Graphical representation of the research method

Source: own elaboration.

CATI Method

In research with the use of the CATI method, the respondent is interviewed over the telephone while the interviewer reads out the questions and notes the answers, using a special computer script (Escher, 2020).

The assumptions for the CATI method are outlined below:

- Based on the Waste Database, a list of entities identified as, selling the following groups of waste was drawn up:
 - Code 19 12 10 – combustible waste (alternative fuel);
 - Code 19 12 12 – other waste (including mixed substances and objects) from mechanical treatment of waste other than those mentioned in 19 12 11;
 - Code 20. 01.38 – wood other than that mentioned in 20 01 37;
 - Code 19 12 06* – wood containing dangerous substances;
 - Code 20 01 37* – wood containing dangerous substances (communal origin).
- The population was then narrowed down by the following criteria:
 - the search area was narrowed down to four provinces (*Pomorskie, Zachodniopomorskie, Kujawsko-Pomorskie, Wielkopolskie*), as these determine the potential investment option (logistical, cost, time reasons);
 - only companies with legal personality were selected for the study in order to make it plausible to eliminate micro, small entities of negligible research value from the study.

- All entities registered in BDO (as at 3 January 2023) appearing in the system as trading in the indicated waste codes and mixing in the narrowing criteria were adopted as the population for this study and it amounts to 242 entities.
- From the population, a survey sample of 148 entities was selected by random sampling.
- The sample was determined with a confidence level of 95%, a fraction size of 0.5 and a maximum error of 5%.
- The survey was conducted between 3 January 2023 and 5 September 2023.
- The interviewer makes three attempts to contact subjects by telephone on three different dates. If unable to provide information by telephone, respondents are directed to email contact, the email request for enquiry being repeated by the interviewer a total of three times.

Respondents were asked questions according to a collated research scenario.

In-Depth Interview Method with Potential Bidders

The interview method focused on telephone interviews with bidders who declared the possibility of selling the municipal waste subject of this study.

4. Results

4.1. Results of the CATI survey

The survey attempted to contact the research sample (148 entities). When contacted by the interviewer, either by telephone or email, 97 of the surveyed entities responded which represents 66% of the total survey sample (see Figure 2).

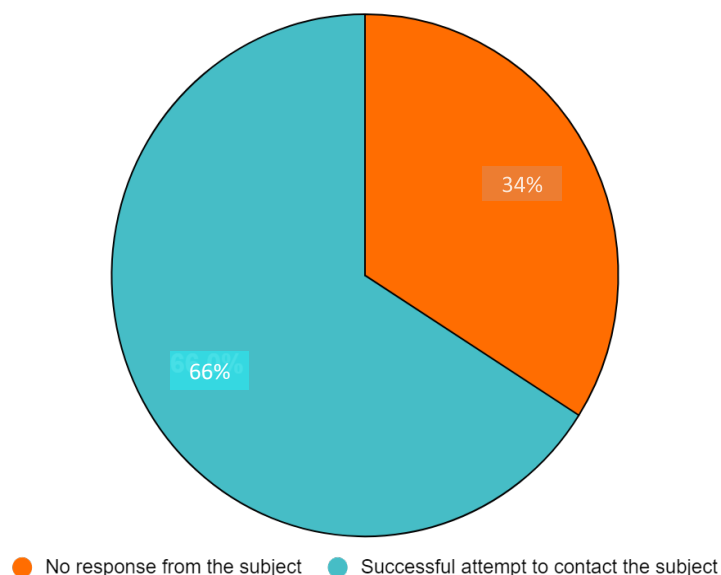


Figure 2. Percentage of subjects in the research sample who responded to the interviewer's attempted contact in the CATI method – short interview

Source: own elaboration.

Of the entities that responded to the contact sample, five entities declared a supply of waste from the groups surveyed. They represent 3.4% of the survey sample (Fig. 3).

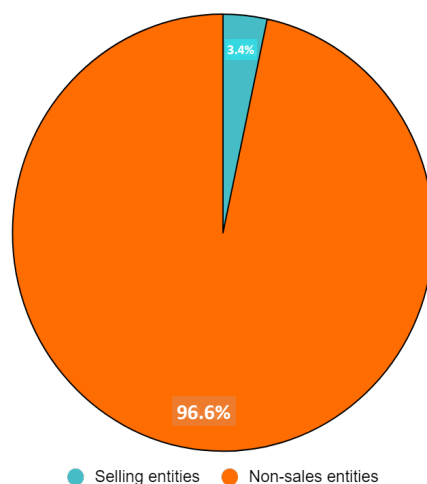


Figure 3. Percentage of entities in the survey sample that confirmed selling specific waste groups during the contact sample, CATI method – short interview

Source: own elaboration.

As a result of the survey, the existence of a supply of the desired waste groups of at least 1203.1 thousand tonnes per year in the study area was proven.

A detailed summary of the entities and the declared supply (the names of the companies have been kept secret, the legal forms of the companies are given) is presented in Figure 4.

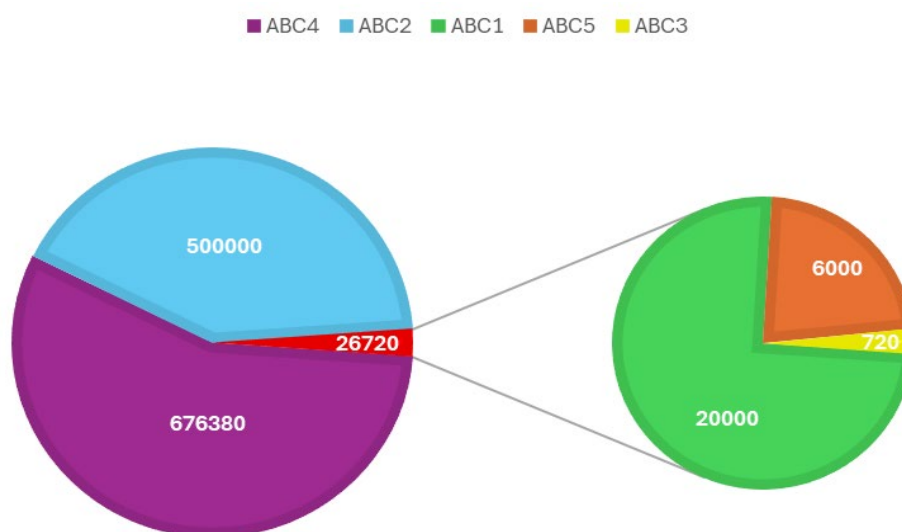


Figure 4. Detailed list of entities that declared the sale of specific groups of waste during the contact sample together with the declared level of supply in tonnes, CATI method – short interview

Source: own elaboration.

Below is a commentary on the entities included in Figure 4.

ABC1 sp. z o. o. sp. k.

level of supply: several tens of tonnes per year of waste were declared in total for the groups indicated. Due to the ambiguous understanding of the word 'several dozen', the minimum understood value of the word 'several dozen' was adopted, i.e. 20,000 t per year.

ABC2 sp. z o.o.

supply level: 500,000 t per year of waste summed for the groups indicated was declared.

ABC3 sp. z o.o.

level of supply: 720 t per year of waste declared summed for the groups indicated.

ABC4 Sp. z o.o.

level of supply: 676,380 t per year of waste was declared for waste group 19.12.12 on the basis of available supply in 2022.

ABC5 sp. z o.o.

level of supply: 6,000 t per year of waste were declared in total for the indicated groups.

4.2. Findings from the in-depth interview method

The interview method focused on a telephone interview with the bidders who declared the possibility of selling the waste subject of this study. An attempt was therefore made to interview five entities:

- ABC1 sp. z o.o. sp. k.
- ABC2 sp. z o.o.
- ABC3 sp. z o.o.
- ABC4 sp. z o.o.
- ABC5 sp. z o.o.

As a result of the audit, additional information was obtained from three companies: ABC5 sp. z o.o. ABC3 sp. z o.o., ABC4 Sp. z o.o. Each of these companies expressed: willingness to sign a contract (e.g. for five years) for waste supply, willingness to sign a letter of intent for cooperation and the possibility of sending an e-mail offer. Only one company, ABC3 sp. z o.o., provided information on the price of waste sales. municipal RDF waste was PLN 380. Surcharge per tonne to pre RDF waste was PLN 470. The other two companies refused to answer questions.

The information collected in the in-depth interview confirms the willingness of the contractors to cooperate and makes the investment project plausible. They also indicate a negative purchase price for waste from the buyer's perspective.

5. Discussion and Conclusions

The purpose of this study was to test the usefulness and adequacy of the Waste Database as a source of knowledge about waste. Based on the research carried out, the primary objective was achieved. The findings indicate that while the database provides some valuable information, its reliability and completeness are limited, which affects its overall usefulness.

The study on the usefulness of the National Waste Database of the Ministry of the Environment carried out by the research team using CATI and in-depth interview methods was based on three research questions that were answered during the research. Research questions posed:

- How many % of the entities surveyed responded to contact from the interviewer, either by phone or email;
- How many % of the subjects who responded to the contact attempt declared a supply of waste from the groups surveyed?
- What additional information did the in-depth interview provide?

The research highlighted important issues related to the reliability of publicly available waste data. Of the 148 entities surveyed, only 98 responded to the attempted contact, representing less than two-thirds of the survey sample (65.54%). Of these, only 5 entities expressed a genuine willingness to sell the waste covered by the survey (3.37% of the survey sample). The additional information collected from the aforementioned five entities in the in-depth interview confirms the willingness of the contractors to cooperate and allows us to assume that the investment project described in the case study will be implemented. They also indicate a negative purchase price for waste from the buyer's perspective.

The findings illustrate the lack of reliability and timeliness of the information available in BDO, highlighting the need for caution and careful verification of information before making decisions based on this data. Only five companies out of 98 were fulfilling the function (waste sales declaration) declared in BDO.

The survey may be the beginning of considerations on the scale of the problem of the inadequacy of the information provided for public use on the Internet and initiate further research on this topic in other sectors. In the context of waste management, inaccuracies in data can lead to inadequate waste management, which can have negative consequences for the environment and public health. This can result in inefficient use of resources, uncontrolled growth of waste and improper waste management.

Accepting the data recorded in the BDO as statistical data, exposes the analyses performed on the basis of this data to unreliability and inconsistency with the actual state of affairs. The consequence of this is that incorrect and false conclusions are drawn because the batch data are incorrect.

Knowledge and awareness of the existence of irregularities in the BDO forces persons and entities obtaining information from it to apply additional tools for obtaining and verifying source data. This is realised, for example, by means of CATI and face-to-face and in-depth interviews.

The final conclusion of the research is to report the need to take measures to improve the quality and timeliness of data in the databases in order to increase their usefulness and the trust of users. It is also crucial to increase the transparency and accessibility of the data, which will enable more effective waste management and reduce the negative impact on the environment. It is also worth promoting education on the proper use of data and encouraging collaboration among all waste management stakeholders to build a more comprehensive and reliable picture.

This study has also a limitations. First limitation is narrow focus on a specific group of entities and its reliance on a limited number of methods (CATI and in-depth interviews). This may affect the possibility to generalize findings to other sectors or larger samples. Furthermore, the data set was restricted to publicly available information, which may have excluded more up-to-date or accurate data accessible through other means.

This research has a contribution to science by broader understanding of waste management. It was achieved by highlighting the significant inconsistencies in public waste databases.

Future research should explore the issue of data reliability in waste management on a larger scale, possibly including cross-sector comparisons and using a more diverse set of data collection tools. Additionally, studies could investigate methods to enhance data transparency and accessibility to support more informed decision-making and improve the overall efficiency of waste management systems.

References

- Al-Dmour, N. A., Ali, L., Salahat, M., Alzoubi, H. M., Alshurideh, M., & Chabani, Z. (2023). Information Systems Solutions for the Database Problems. In M. Alshurideh, B. H. Al Kurdi, R. Masa'deh, H. M. Alzoubi, S. Salloum (Eds.), *The Effect of Information Technology on Business and Marketing Intelligence Systems*. (pp. 703-715). Springer. https://doi.org/10.1007/978-3-031-12382-5_37.
- Bertino, E., & Sandhu, R. (2005). Database Security – Concepts, Approaches, and Challenges. *IEEE Transactions on Dependable and Secure Computing*, 2(1), 2-19. <https://doi.org/10.1109/TDSC.2005.9>
- Bitkowska, A., & Chruściel, T. J. (2020). Systemy informatyczne w przedsiębiorstwach gospodarki komunalnej na przykładzie województwa zachodniopomorskiego. *Zeszyty Naukowe Politechniki Częstochowskiej. Zarządzanie*, 37, 7-17. <https://doi.org/10.17512/znpcz.2020.1.01>
- BDO. (n.d.). *O BDO*. Baza danych o produktach i opakowaniach oraz o gospodarce odpadami. <https://bdo.mos.gov.pl/o-systemie-bdo/>

- Bullock, J. C. (1995). Environmentally Sound Management of Electronic Scrap and the Basel Convention on Control of Transboundary Movements of Hazardous Wastes and Their Disposal. In *Proceedings of the 1995 IEEE International Symposium on Electronics and the Environment ISEE (Cat. No.95CH35718)*, May 1-3, 1995, Orlando, Florida (pp. 192-197), <https://doi.org/10.1109/ISEE.1995.514974>
- Chomiak-Orsa, I., Greńczuk, A., & Łuczak, K. (2013). Technologie multimedialne w zarządzaniu. Analiza bibliometryczna. In L. Kiełtyka (Ed.), *Wykorzystanie technik informacyjnych w zarządzaniu* (pp. 151-158). Wydawnictwo Politechniki Częstochowskiej.
- Chomiak-Orsa, I., Hauke, K., Perechuda, K., & Pondel, M. (2023). The Use of Digital Twin in the Sustainable Development of the City on the Example of Managing Parking Resources. *Procedia Computer Science*, 225, 2183-2193. <https://doi.org/10.1016/j.procs.2023.10.209>
- Chomiak-Orsa, I., & Martusewicz, J. (2023). Creating Good Practice in Effective Sustainability Management by Implementing the EFQM Model. *Procedia Computer Science*, 225, 3517-3526. <https://doi.org/10.1016/j.procs.2023.10.347>
- Connolly, T., Begg, C. (2004). *Systemy baz danych. Projektowanie, wdrażanie i zarządzanie w praktyce*. tł. Przemysław Kanarek, Tomasz Jurdziński, Marek Piotrowski. ReadMe.
- Denning, D. E., & Denning, P. J. (1979). Data Security. *ACM Computing Surveys*, 11(3), 227-249. <https://doi.org/10.1145/356778.356782>
- Escher, I. (2020). *Wprowadzenie do badań marketingowych*. Wydział Nauk Ekonomicznych i Zarządzania, Uniwersytet Mikołaja Kopernika w Toruniu.
- Janicki, W. (2005). Jakość bazy danych. *Automatyka/Akademia Górniczo-Hutnicza im. Stanisława Staszica w Krakowie*, 9(3), 783-790.
- McNeill, P., Woodard, R., & Williams, M. (2021). Waste Duty of Care Regulations: Evaluation of Enforcement Strategies by Local Authorities in England. *Journal of Cleaner Production*, 312, Article 127654. <https://doi.org/10.1016/j.jclepro.2021.127654>
- Okman, L., Gal-Oz, N., Gonen, Y., Gudes, E., & Abramov, J. (2011). Security Issues in NoSQL Databases. In G. Wang, S. R. Tate, J.-J. Chen, K. Sakurai (Eds.), *IEEE 10th International Conference on Trust, Security and Privacy in Computing and Communications, Changsha, China, 2011* (pp. 541-547). <https://doi.org/10.1109/TrustCom.2011.70>
- Olson J. (2003). *Data Quality*. Morgan Kaufmann Publishers.
- Perechuda, K., & Chomiak-Orsa, I. (2015). *Wiedza i informacja w akceleracji biznesu*. Wydawnictwo Wydziału Zarządzania Politechniki Częstochowskiej.
- Ramakrishnan, R., & Gehrke, J. (2002). *Database Management Systems*. (3rd ed.). McGraw-Hill.
- Stanik, J., & Kwiatkowski, P. (2000). *Zapewnienie jakości systemów informatycznych – elementy dobrej praktyki*. Wojskowa Akademia Techniczna.
- Tirado, R., Aublet, A., Laurenceau, S., & Habert, G. (2022). Challenges and Opportunities for Circular Economy Promotion in the Building Sector. *Sustainability*, 14(3), Article 1569. <https://doi.org/10.3390/su14031569>

Analiza Bazy Danych Odpadowych Ministerstwa Środowiska jako źródła wiedzy o odpadach – studium przypadku

Streszczenie

Cel: Celem niniejszego badania było ocenienie użyteczności i adekwatności Ogólnopolskiej Bazy Danych Odpadowych Ministerstwa Środowiska jako głównego źródła informacji o odpadach w Polsce. Przeanalizowano reprezentatywną próbę podmiotów zarejestrowanych w bazie pod kątem odpowiedzi na próby kontaktu oraz deklaracji dotyczących sprzedaży określonych grup odpadów, mających znaczenie dla planowanej inwestycji firmy X (nazwę firmy utajniono).

Metodyka: Badanie zostało przeprowadzone przy użyciu dwóch głównych metod badawczych: CATI oraz wywiadu pogłębionego. Metoda CATI obejmowała telefoniczny kontakt z próbą reprezentatywną podmiotów z Bazy Danych Odpadowych w celu zbadania odpowiedzi na próby kontaktu oraz deklaracji dotyczących sprzedaży wybranych grup odpadów. Wywiad pogłębiony natomiast koncentrował się na szczegółowych rozmowach z wybranymi oferentami, którzy zadeklarowali gotowość do współpracy w zakresie dostawy odpadów zgodnie z kryteriami badawczymi.

Wyniki: Badanie wykazało, że z reprezentatywnej próby 148 podmiotów zarejestrowanych w Ogólnopolskiej Bazie Danych Odpadowych Ministerstwa Środowiska, 65,54% odpowiedziało na

próbę kontaktu metodą CATI. Spośród nich tylko 3,37% podmiotów zadeklarowało rzeczywistą gotowość do sprzedaży określonych grup odpadów. Metoda wywiadu pogłębionego potwierdziła chęć współpracy z trzema spośród pięciu firm, które zadeklarowały podaż odpadów. Wnioski z badania podkreślają niepełność oraz potrzebę aktualizacji danych w BDO, co może prowadzić do nieefektywnego zarządzania odpadami oraz negatywnych skutków dla środowiska i zdrowia publicznego.

Implikacje i rekomendacje: Wyniki przeprowadzonego badania wskazują na istotne implikacje dla zarządzania odpadami w Polsce. Niepełność oraz niedostateczna aktualizacja danych w Ogólnopolskiej Bazie Danych Odpadowych Ministerstwa Środowiska mogą prowadzić do nieefektywnego gospodarowania odpadami oraz niekorzystnych konsekwencji dla środowiska i zdrowia publicznego. Zaleca się przeprowadzenie dalszych badań w celu głębszej analizy rzetelności danych zawartych w BDO oraz ich aktualności. Warto również rozważyć wprowadzenie środków mających na celu zwiększenie transparentności i dostępności informacji w bazie, co przyczyniłoby się do skuteczniejszego zarządzania odpadami w Polsce. Edukacja użytkowników BDO w zakresie prawidłowego korzystania z danych oraz zachęcanie do współpracy wszystkich zainteresowanych podmiotów mogą również przyczynić się do budowy bardziej rzetelnego obrazu sytuacji w gospodarce odpadami.

Oryginalność/wartość: Oryginalność i wartość przeprowadzonych badań wynikają z analizy użyteczności Ogólnopolskiej Bazy Danych Odpadowych Ministerstwa Środowiska jako głównego źródła informacji o odpadach w Polsce. Badanie wykorzystało innowacyjne podejście metodologiczne, takie jak CATI i wywiad pogłębiony, aby ocenić rzetelność danych oraz adekwatność informacji dostępnych w bazie. W kontekście gospodarki odpadami w Polsce, nasze wyniki podkreślają istotne niedociągnięcia w aktualizacji danych oraz potrzebę zwiększenia transparentności w zarządzaniu odpadami. Implikacje naszych badań wskazują na konieczność dalszych działań mających na celu poprawę jakości danych oraz ich dostępności, co może przyczynić się do bardziej efektywnego i zrównoważonego zarządzania odpadami na poziomie krajowym.

Słowa kluczowe: gospodarka odpadami, Ogólnopolska Baza Danych Odpadowych, efektywność zarządzania odpadami, transparentność informacji
