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**Review of the doctoral dissertation of Mr Khalil Bayramov, M.A., titled „Improving Waste Management Operations in the Oil and Gas Industry through Reverse Logistics" written under the scientific supervision of dr hab. T. Bartosz Kalinowski, prof. UŁ at the Faculty of Management, University of Lodz**

The basis for preparing the review is the letter from 17 February 2026 signed by prof. dr hab. Ewa Walińska, the Chair of the Committee for Academic Degrees in the Discipline of Management and Quality Studies at the University of Lodz, requesting an evaluation of the above-mentioned doctoral dissertation pursuant to Articles 187 and 190 (2-4) of the Act of 20 July 2018 on Higher Education and Science (Journal of Laws 2024, item 1571, with later amendments) and §5 (5-7) of the Regulations specifying the detailed procedure for awarding the degrees of doctor and habilitated doctor at the University of Lodz (Resolution No. 660 of the Senate of the University of Lodz of January 27, 2020, as amended).

## 1. The Relevance of the Dissertation Topic

The doctoral dissertation titled "Improving Waste Management Operations in the Oil and Gas Industry through Reverse Logistics" prepared by Mr Khalil Bayramov, falls within the discipline of management and quality studies in the field of social sciences. The validity of the dissertation topic is supported by both the existing body of literature and the needs of business practice. The relevance of the topic is particularly evident given the importance of waste management in business processes and the growing role of reverse logistics within supply chain management. Designing, implementing, and improving business solutions in these managerial areas attracts the attention of both researchers and practitioners, respectively within scientific



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inquiry and business projects. Moreover, the significance of waste management operations within supply chain management continues to increase in light of the sustainable development megatrend and the circular economy concept. In conclusion, the dissertation's title reflects a current and important topic with substantial research and practical application potential.

## 2. Research Gaps, Problems, Objectives and Questions

In the Introduction, the Author presents the research gaps, research problems, the objectives of the thesis, and the research questions. The nine identified research gaps (RGs) (pp. 15–16) are grouped into three categories - theoretical, empirical, and methodological - as follows:

**Theoretical gaps:**

**RG1** - The existing literature lacks comprehensive coverage on implementing reverse logistics during waste management operations in the oil and gas sector.

**RG2** - There is limited research about the place that reverse logistics takes part in supply chain in oil and gas industry.

**RG3** - There is a shortage in literature about the role and engagement of supply chain parties in reverse logistics and waste management activities realized in oil and gas sector.

**RG4** - Insufficient analysis of outsourcing opportunities for reverse logistics and waste management activities in the petroleum industry.

**RG5** - A gap in the existing research landscape is the need for a comprehensive exploration of how Industry 4.0 technologies can be effectively harnessed to optimize waste management operations and streamline reverse logistics processes within the oil and gas industry's supply chain management.

**Empirical gaps:**

**RG6** - The lack of empirical primary data, validation and limited sample size hinders understanding the practical implementation of reverse logistics during waste management in the oil and gas industry, potentially leading to incomplete insights into effective practices.

**RG7** - The literature is almost silent about designing reverse logistics network tailored for oil and gas industry.

**Methodological gaps:**

**RG8** - The need for more comprehensive approaches that consider multiple variables in reverse logistics for oil and gas waste management.

**RG9** - Lack of a structured framework to assess outsourcing decisions in reverse logistics and waste management, including criteria for partner selection, compliance assurance, and performance monitoring in the oil and gas sector.



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The essence of the gaps identified by the Author relates primarily to conducting original research in a new industry. I appreciate the attempt to distinguish theoretical, empirical, and methodological gaps. However, classifying them mainly on the basis of research conducted in a new industry aligns most closely with an empirical gap. Moreover, the gaps are framed more in terms of potential applied value than scientific contribution. A more precise and rigorous formulation of the gaps would therefore be desirable.

The Author specifies eight research problems (RP) (pp. 16-17), listed below.

**RP1** - Oil companies miss the opportunities of reverse logistics raising from lack of awareness about its benefits and implementation methods.

**RP2** - Waste Management operations are not centralized because of a lack of reverse logistics activities in most businesses.

**RP3** - Lack of theoretical and empirical research on petroleum oil from reverse logistics perspective compared to other sectors.

**RP4** - There is a lack of literature about the place of reverse logistics in supply chain of oil and gas industry.

**RP5** - Limited research on participation of supply chain parties in reverse logistics/waste management activities.

**RP6** - Outsourcing opportunities within reverse logistics operations in petroleum industry are not fully discovered by companies.

**RP7** - Shortage on literature about barriers and challenges companies can face during reverse logistics/waste management operations.

**RP8** - The research gap lies in the absence of a comprehensive investigation into the effective integration of Industry 4.0 technologies to optimize waste management and streamline reverse logistics in the oil and gas industry's Supply Chain Management.

In my opinion, the reviewed dissertation lacks a properly formulated main research problem, which should be objective, grounded in existing knowledge, and referring to an interesting fact, phenomenon, or relationship (Nowosielski, 2012). When formulating a research problem, it is a mistake to attempt to address too many phenomena and processes, and to avoid this, it is necessary to select thematic threads appropriately (Nowosielski, 2012; Sudoł, 2007). Statements RP3, RP4, and RP7 describe the state of the topic in the literature based on the Author's review. RP1, RP2, and RP6 resemble research hypotheses, which would, however, require quantitative research. Finally, RP5 and RP8 correspond more closely to research gaps than to research problems. Moreover, the Author uses ambiguous expressions such as "the place



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of reverse logistics in the supply chain" and "not fully discovered by companies," which may be interpreted in different ways.

Next, the main research purpose is not clearly or precisely defined, which is a serious shortcoming of the thesis. The Author presents the objectives of the study descriptively as follows: "This study aims to explore how reverse logistics can be strategically integrated to improve waste management in the oil and gas industry, while also addressing key challenges and identify research gaps that still exist in this area. The central goal of this research is to offer a comprehensive and novel exploration into the significance, challenges, and opportunities linked with reverse logistics and its pivotal role within the supply chain dynamics of the oil and gas sector. By closely examining the benefits and practical strategies for implementing reverse logistics, this study aims to offer new insights that can help to improve waste management processes and boost the overall efficiency of supply chain operations in the oil and gas industry. Moreover, this research seeks to investigate the potential barriers and challenges that enterprises may encounter while implementing reverse logistics strategies and subsequently propose effective strategies to overcome these hurdles successfully. Additionally, this study aims to examine the role and significance of emerging Industry 4.0 technologies and software applications in streamlining waste management operations and reverse logistics processes within the supply chain of the oil and gas industry. (...) Overall, this research aims to offer insights and recommendations, supporting a sustainable approach to waste management and reverse logistics while cultivating a more streamlined, efficient, and ecologically conscious supply chain landscape for the oil and gas industry" (pp. 14-15).

I recommend distinguishing the main objective from the secondary objectives of the doctoral dissertation to ensure scientific rigor. In my view, the chosen, somewhat enigmatic way of presenting the research goals has introduced confusion and repetition, resulting in a lack of conceptual clarity in Subchapter 1.2 (pp. 14–15).

To conclude this part of the review, I note that the Author has identified the necessary elements of research conceptualization, which constitute a sufficient foundation for undertaking the dissertation topic. However, the research concept has shortcomings, particularly with respect to the level of scientific precision expected of a researcher.

## 3. Evaluation of the Research Procedure

The research procedure consisted of three main stages.

1. A systematic literature review.
2. Semi-structured individual interviews.



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3. Case studies.

In the first stage, the PhD Candidate conducted a systematic literature review (SLR). He stated that "the literature review was conducted in several stages, following the steps proposed by Tranfield et al. (2013) and Kitchenham et al. (2009)" (p. 45). The screening process was based on PRISMA guidelines. The Author provided sufficient information about the SLR, including the systematic review protocol in Table 4 (p. 47) and the PRISMA flow chart in Figure 3 (p. 48). The review covered articles from the Scopus and Web of Science databases, which currently represent the standard sources for systematic reviews. In total, 280 publications (articles, conference papers, and book chapters), written in English and published between 2001 and 2022, were identified and screened for inclusion or exclusion based on titles, keywords, and abstracts. After subsequent stages of analysis, 35 publications were ultimately selected. Both the review procedure and its results are presented in Chapter 3.

It should be noted that the selected keywords enabled the identification of publications on reverse logistics, waste management, outsourcing, and supply chain management in the chosen industry. However, limiting the search to the petroleum industry also has drawbacks. It led to the omission of important literature on key issues related to reverse logistics, waste management, and outsourcing within supply chain management - for example, industry-independent definitions, concepts, and frameworks, as well as strategies and practices developed in other mining industries. Additionally, the SLR could have included more recent publications, at least from 2023–2024.

In the second stage, the Author conducted qualitative empirical research using semi-structured interviews based on a questionnaire consisting of nine open-ended questions (Appendix A, p. 270). The respondents were selected purposively and included informants representing companies from the oil and gas industry (BP, ExxonMobil, Shell, TotalEnergies, Equinor, SOCAR) as well as one waste-management solutions provider (AA Services). All respondents work professionally in managerial fields related to "reverse logistics," "health, safety and environment," or "environment" (p. 110). The purposive sample consisted of 22 respondents from the six companies listed above. The characteristics of the respondents' professional profiles are presented in Table 41 (p. 115). The interviews were conducted between February 2023 and January 2025, mostly via virtual platforms. I appreciate the research effort undertaken by the PhD Candidate, who successfully carried out the study among representatives of international companies in various countries despite the challenges and limitations rightly noted in Section 4.5 (p. 114). I assess the data-collection stage of the empirical research positively. For the analysis of the collected data, the Author used the web-based qualitative



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data-analysis tool Taguette (taguette.org). In my view, the choice of tool and the implementation of the data-analysis stages (including coding) are appropriate. However, the presentation of the results is too general and superficial.

I assess the application of the multiple case study method very positively. The Author presents five case studies of oil and gas companies operating globally and one case study of a company operating in Azerbaijan. Each case study draws on complementary streams of primary and secondary data. All case studies are well designed and structured. The Author demonstrates the ability to collect, analyse, and synthesize data to develop coherent case studies.

To summarize the evaluation of the selected methods and tools, as well as the Author's ability to apply them, I conclude that the research procedure incorporated:

- a literature review demonstrating the methodological strengths of a systematic literature review, and
- the correct implementation of qualitative research, consisting of interviews with 22 company representatives and the use of the collected data to develop original case studies.

The Author has demonstrated sufficient ability to conduct research projects.

## 4. Assessment of the Substantive Value of the Dissertation

The title of the doctoral dissertation is "Improving Waste Management Operations in the Oil and Gas Industry through Reverse Logistics", and overall, the content of the thesis is consistent with this title.

The Introduction is presented as Chapter 1. It covers the following elements: research methodology, research objective, research gaps, research problems, research questions, and the structure and content of the thesis. In my view, the introduction is too long and could be a more concise synthesis of the research assumptions. It is also worth noting that the Author repeats a considerable amount of information in later parts of the thesis, such as the description of research methods.

Chapter 2 is titled "Reverse Logistics and Waste Management in the Oil and Gas Industry". The Author attempts to present definitions of reverse logistics (RL) and its role in supply chain management, followed by drivers and barriers to RL processes and activities, types of waste in the oil and gas industry, outsourcing of RL processes, performance measurement in RL, and technological innovations in waste management and reverse logistics. The discussion of these topics is based on selected publications. However, the Author did not avoid significant weaknesses, including a general approach to defining concepts and a lack of scientific



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discussion. Although various approaches and contexts for defining reverse logistics are presented, the relationships between reverse logistics, logistics, logistics management, and supply chain management are not explained. Waste management also remains insufficiently clarified based on the literature review. Furthermore, the key relationship between reverse logistics and waste management has not been adequately addressed.

Additionally, Section 2.1 lacks reference to the circular economy (CE), even though the Author lists the key "R" strategies of CE (e.g.: reduce, reuse, recover, recycle) when describing reverse logistics. The discussion of drivers and barriers to reverse logistics in Subchapter 2.2 is descriptive and sequentially presents the views of various authors, but lacks discussion on these threads. Although the title of this section suggests a distinction between reverse logistics processes and activities, these are not specified in the text. Subchapter 2.3 outlines types of waste in the oil and gas industry and the specific nature of waste management in this industry. Subchapter 2.4 describes the main aspects of reverse logistics outsourcing. In Subchapter 2.5, the Author focuses on performance measurement in reverse logistics, highlighting key criteria and dominant performance indicators. Subchapter 2.6 discusses selected technological innovations - particularly Industry 4.0 technologies - in waste management and reverse logistics.

It is worth noting that Chapter 1 introduces several important concepts that are not defined, including: reverse logistics system, reverse logistics configuration, reverse logistics paradigm, reverse supply chain, closed-loop supply chain, supply chain management, green supply chain management, green operations, and sustainable business. Presenting their definitions and clarifying the position of waste management and reverse logistics within these frameworks would significantly enhance the substantive quality of the theoretical discussion. These issues should also contribute to a scientific debate, which is missing in the theoretical Chapter 2.

Chapter 3, titled "Systematic Literature Review (SLR)", presents the SLR procedure, provides a descriptive analysis of the reviewed publications, outlines key insights and limitations of the SLR, and identifies research gaps emerging from the literature review. The results of the analysis of 35 sources were presented in 35 tables, each containing answers to the following questions: "Why was the study conducted?", "How was the research conducted?", "What was the research objective?", "What thematic area did research cover?", "What was the contribution of the research?", "What was the limitation?", "What future research areas were identified?", "When was the research conducted?" and "Where was the research conducted?" I consider this approach to literature analysis transparent, but considerably less demanding than engaging in a scholarly discussion of the issues presented in the selected articles. In subsection



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3.4, the Author identified research gaps and classified them as theoretical, methodological, and empirical, providing a brief and concise description of their scope in relation to the findings of the literature review.

In Chapter 4, titled "Interview Process and Qualitative Data Analysis", the Author presents the research procedure for the 22 interviews conducted for the purposes of the dissertation with representatives of the oil and gas industry. Through the coding of the collected qualitative data, the Author identified six leading themes ("the importance and role of reverse logistics in supply chain operation; structuring reverse logistics processes for maximum efficiency; stakeholder collaboration and interdepartmental coordination; outsourcing as a strategic decision in reverse logistics; addressing barriers to reverse logistics implementation; the role of technology in advancing reverse logistics and waste management" – p.122) and the key category "Optimizing reverse logistics for sustainable and efficient waste management in the oil and gas industry" (p. 122). However, the Author did not elaborate on what optimization entails in the context of the study, leaving this concept insufficiently clarified.

In Chapter 5, the Author presents the methodology for developing the case studies, justifies the selection of the companies included in the analysis, and explains the approach used to examine data obtained from various sources. The application of source triangulation in the case study research is, in my view, a commendable aspect of the thesis. The Author developed original case studies of the companies BP, Equinor, ExxonMobil, Shell, TotalEnergies, and SOCAR. The data collected during the interviews were effectively used to support the Author's reasoning. Each case study follows the same structure, covering such issues as: awareness levels within the company and among stakeholders; waste disposal and handling strategies; waste classification and types; recycling, reuse, and waste reduction initiatives; waste transportation and logistics; performance monitoring and key performance indicators (KPIs); challenges in waste management and reverse logistics; opportunities for improvement and future strategies.

In Chapter 6, the Author conducts a discussion of the six themes identified in Chapter 4, drawing on the results of the empirical research. Each theme is examined in relation to the research questions posed in the dissertation. The Author develops the discourse effectively, incorporating quotations from interviews with representatives of companies in the industry. The conclusions are supported by argumentation, and references to the relevant literature are provided. The discussion is constructive and leads to the formulation of conclusions and answers to the research questions. An issue that remains insufficiently resolved is how the Author defines reverse logistics and waste management, as well as how the relationship between these concepts is understood in theory and between these management areas in



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business practice. A particularly interesting and original part of the chapter is Section 6.7, in which the Author presents comparative analyses (Tables 52, 53). Chapter 6 concludes with practical recommendations for managers responsible for reverse logistics in oil and gas enterprises. The implementation guide for reverse logistics is transparent and outlines key decision steps and actions. However, it does not reflect the specific characteristics of the industry under study. This raises the question of whether the steps proposed by the Author are universal for business practice.

Chapter 7 presents the limitations of the research process conducted by the Author. Their identification demonstrates an awareness of the constraints of the completed work in the context of empirical inquiry. Among the limitations indicated are: the scope of the case studies, the limited diversity of respondents, the availability and depth of the collected data, the period during which the research was conducted, and the geographical range of the study. The Author did not also address the limitations arising from the systematic literature review. Due to the source-selection criteria, relevant publications were excluded – articles and monographs that define and systematize key concepts and issues, including the relationship between reverse logistics and waste management, the processes within both areas, and the measurement of reverse-logistics performance. In Chapter 7, the Author also proposes directions for future research.

In the Conclusions, the Author summarizes the discussion by presenting the key findings in relation to the research questions and identified gaps.

## 5. Evaluation of the Literature Selection

The final list of references includes 218 literature sources (mostly journal articles) and 11 web-based sources, including primary corporate information and reports from the case study companies. Unfortunately, no monographs are included in the reference list. The cited articles were published predominantly in peer-reviewed journals, many of which are internationally recognized. The relevance of the sources to the focus of the dissertation is, for the most part, appropriate. All references are in English for obvious reasons. Publications from the last five years (from 2021 onward) constitute a sufficient proportion of the overall literature (22%). However, the literature review does not include English-language publications authored by Polish scholars, which I consider a significant weakness of the dissertation. Nevertheless, the selection of literature - both in terms of volume and quality - can be assessed as appropriate and adequate for a doctoral thesis.



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## 6. Evaluation of the Structure of the Doctoral Dissertation

The reviewed dissertation consists of 270 pages of which 250 are devoted to the topic, and the remaining 20 pages are: References (pp. 251-266), List of Tables (pp. 266-268), List of Figures (p. 268), Acknowledgments (p. 269), and Appendix A: Semi-structured Interview Questions (p. 270). The dissertation consists of seven chapters. It opens with the Introduction, presented as Chapter 1 (pp. 6–23). Chapter 2 titled "Reverse Logistics and Waste Management in Oil and Gas Industry" (pp. 24-44) is theoretical in nature and provides basic definitions and concepts related to waste management and reverse logistics. Chapter 3 "Systematic Literature Review (SLR)" (pp. 45-109) presents the SLR procedure and key findings from the SLR process. Chapter 4 titled "Interview Process and Qualitative Data Analysis" (pp. 110-124) is focused on the empirical research procedure, qualitative data analysis, and selected findings. Chapter 5 "Case studies" (pp. 125-215) presents the Author's research engagement in the multiple case study development followed by detailed case studies. Chapter 6 "Results and Discussion" (pp. 216-243) addresses the main research results according to specified research problems and ends with recommendations for the design of a reverse logistics network in oil and gas companies. Chapter 7 titled "Limitations and Future Research" (pp. 244-246) focuses on the methodological limitations of the thesis and avenues for the development of research and business practices in the future. In the "Conclusions" (pp. 247-250), the Author mainly presents concise answers to research questions and gaps, and furthermore, shortly addresses the scientific contribution as well as practical implications of the dissertation. In my opinion, the limitations of the study, recommendations, and further research directions should be an integral part of the Conclusions.

It should be noted that the chapters vary considerably in length, and the inclusion of subsections limited to half a page or a single page is not fully justified. Nevertheless, the content of each section is consistent with its title. The Author's considerations are presented in a coherent and logically structured manner. Therefore, despite the aforementioned shortcomings, the overall assessment of the dissertation's structure is positive.

## 7. Formal Evaluation of the Doctoral Dissertation

The dissertation has been prepared with sufficient formal rigor. The Author's language is appropriate for the research issues addressed within the field of management and quality studies. The text is enriched with numerous tables and figures, which add value, although some figures (e.g.: Figure 1, p. 8) should be presented in a larger format for improved readability. The text contains multiple missing punctuation marks. The Author follows standard citation



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practices within the body of the work. The bibliography is carefully compiled, though a few minor omissions appear in the source details. The entries for online sources lack access dates.

## 8. Conclusion

I conclude that the reviewed doctoral dissertation meets the statutory criteria for doctoral theses, and I emphasize the following:

1. The dissertation presents an original solution to the research problem. The subject of the dissertation and the research design demonstrate the Doctoral Candidate's ability to develop a coherent conceptual framework and to conduct research that has cognitive value within the discipline of management and quality studies, as well as practical relevance for business practice.
2. The dissertation adequately demonstrates the Candidate's general theoretical knowledge in the discipline of management and quality studies, particularly in the areas addressed in the thesis.
3. The doctoral dissertation confirms the Author's ability to conduct independent research. I positively assess the empirical part of the dissertation and the Author's research skills.

**Finally, I state that the doctoral dissertation by Mr Khalil Bayramov, titled "Improving Waste Management Operations in the Oil and Gas Industry through Reverse Logistics", fulfils the requirements of Article 187 of the Act of 20 July 2018 on Higher Education and Science (Journal of Laws 2024, item 1571, as amended). Therefore, I request that the Author be permitted to proceed to the public defence.**

Barbara Ocicka