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SHAPING GREEN COMPETENCES OF TRANSPORT AND LOGISTICS EMPLOYEES THROUGH GREEN ACTIVITIES

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Purpose: The aim of this research is to identify the directions for shaping green competences in entities within the transport and logistics industry operating in the Polish market, through the implementation of various types of green activities.
Design/methodology/approach: The study was planned and conducted between September 2024 and November 2024. A total of 7149 Environmental, Social, and Governance (ESG) practices implemented between 2016 and 2023 in entities operating within the Polish market were analysed. Of these, 330 ESG practices were identified as directly related to the transport and logistics industry. The descriptions of these identified ESG practices were subsequently analysed using the author's approach, which focuses on examining green activities implemented in business entities and their role in shaping green competences.
Findings: Ninety-two green practices from the transport and logistics industry were identified, based on their attribution to at least one of the eleven identified green activities. The analysis revealed that various types of green practices are being implemented in transport and logistics entities, which can contribute to the shaping of employees' green competences.
Research limitations/implications: A limiting factor of the study was the selection of a database containing case studies, which was restricted to the ESG practices database on the website of the Forum Odpowiedzialnego Biznesu in Poland. However, this limitation ensured the homogeneity of the descriptions of the analysed ESG practices within the transport and logistics industry in the context of sustainability issues. Furthermore, this approach enables the

possibility of repeating the research in the future, extending it to cover additional periods for comparative purposes, provided that the data are available.
Originality/value: This study distinguishes itself from other research in this field by focusing on the analysis of shaping green competences within the transport and logistics industry through the implementation of various types of green activities. Additionally, six dimensions of green competence are highlighted, including green knowledge, green skills, green behaviour, green attitudes, green abilities, and green awareness. Promising future research avenues in this area could include exploring the role and significance of green practices and related green activities in the transport and logistics industry, particularly concerning the quality of green jobs created or the emergence and functioning of green supply chains. This article is intended for those interested in issues related to the shaping of green competences in the transport and logistics industry.
Keywords: green competences, green economy, green jobs, green logistics, green supply chain, sustainable development.
Category of the paper: Research paper.

1. Introduction

Sustainability has become a significant topic in numerous academic discussions concerning the transport and logistics industry. This body of research can be categorised into purely theoretical studies, practical applications, or a combination of both. Regardless of the classification, it is important to emphasise that researchers in this field aim to identify the role and significance, or even determine the impact, of implementing sustainability principles on the overall functioning of the transport and logistics industry, as well as on the activities of the individual economic actors within it (e.g. Ayadi et al., 2024; Fareed et al., 2024; Nicoletti, Appolloni, 2024). Consequently, in addition to focusing on further economic development, there is a growing emphasis on analysing the interactions between individual economic actors in the transport and logistics industry and the environment. Simultaneously, these studies are situated within a narrower or broader social and business context.

Through the lens of existing research, the authors of this article recognise that the implementation of sustainable development within individual entities in the transport and logistics industry is a complex and multidimensional process. Furthermore, for this process to be truly sustainable, it must be integrated with the existing value system of the organisation, alongside the values derived from the concept of sustainable development. Therefore, taking one-off or sporadic actions towards sustainability will not yield significant benefits or lasting changes necessary for transforming an organisation towards sustainability.

Some of the practices implemented by actors in the transport and logistics industry may contribute to placing them on a sustainable or even greener path (e.g. Beškovnik, Twrdy, 2012; Evangelista, 2014; Vienažindienė et al., 2021). Practices that produce such effects are referred to as sustainable practices (e.g. Ahmad et al., 2024; Andrei et al., 2024), green solutions

(e.g. Pham, N.D.K. et al., 2023), or simply green practices (e.g. Gupta, Singh, 2020; Layaoen et al., 2024; Rosano et al., 2022). However, it is not possible to pinpoint exactly when the greening of the transport and logistics industry will occur, although references to green logistics (e.g. Piva, 2024; Tetteh et al., 2024) or green transport (e.g. Mubarak et al., 2024; Shah et al., 2021) can already be found in some academic discussions. These studies often focus on specific case studies or simply reference green logistics and/or green transport as key directions of change arising from the implementation of sustainable development, particularly the ongoing green transformation of the economy. One notable aspect of this transformation in the transport and logistics industry, which can be observed and studied in individual actors, is the issue of shaping green competence.

The aim of the research presented in this article is to identify the directions for shaping green competences in entities within the transport and logistics industry operating on the Polish market through the implementation of various types of green activities. To achieve this research objective, descriptions of Environmental, Social, and Governance (ESG) practices from 2016 to 2023, implemented by entities in the transport and logistics industry on the Polish market and available in the Responsible Business Forum database, were subjected to scientific analysis. The study conducted qualitative analyses of these ESG practice descriptions, using a structured and pre-prepared tool designed to identify the green actions undertaken within each practice. Based on the identified green actions, further inferences were drawn regarding the directions of green competence shaping among employees in the transport and logistics industry. The data obtained were visualised using the VOSviewer software (version 1.6.20), demonstrating a broader application of this tool than is typically seen in its traditional use for presenting bibliometric data on analysed scientific publications.

The article is divided into five interrelated sections. The first section provides a general introduction to the area of analysis. In addition to highlighting the issue of sustainability and the green transformation occurring in the transport and logistics industry, it also presents the aim of the research and outlines the methods used. The second section offers a literature review focused on green competence and explores the six dimensions of these specific competences. The methodological aspects briefly introduced in the first section are developed and discussed in detail in the third section of the article. A key element of this section is the detailed presentation of the timeline for the analyses undertaken, as well as the procedure for selecting appropriate case studies characterised by green actions. The results, along with the associated discussion, are presented in the penultimate section. This discussion is enriched with suggestions for future research directions in the field. In the concluding part of the research discussion, the authors emphasise that the issue of shaping green competences among employees in the transport and logistics industry is not only an important area for future research but also a significant challenge for managers in this sector, particularly in light of the ongoing green transformation of the economy.

2. Literature review

Research on the issue of green competence cites various definitions of the concept (Olekanma et al., 2024; Sulich, Kozar, 2024). These definitions differ on the one hand, in the approach of individual authors to the question of distinguishing green competences, and on the other hand, in the specifics of the context analysed. Hence, it is worth noting, for example, that Subramanian et al. (2016), in the context of green human resource management, emphasise that green competences are the requisite ecological knowledge, skills and other socioeconomic behavior an individual has to help him/her behave and act rightly and responsibly toward the overall well-being of his/her immediate environment. On the other hand, the research by Cabral & Dhar (2019) indicates that an organisation needs to develop green competencies among human resources (employees/managers) to reduce the harmful impact on the natural environment. Kozar (2017) reaches similar conclusions in research focused on green jobs, highlighting that green competences of employees are the result of their knowledge and skills in applying pro-environmental solutions in the company. The diversity of approaches to research on green competences has led some scholars to attempt to divide them into natural green competencies and acquired green competencies (e.g. Pham, D.D.T., Paillé, 2019; Shoaib et al., 2021; Subramanian et al., 2016). At the same time, various researchers increasingly point out that the concept of green competences is still evolving, both in theory and in practice (Cabral, Dhar, 2021). As a result, comparing individual studies aimed at understanding the role and importance of green competences in the green transformation of the economy proves to be challenging.

The scientific discourse to date on the issue of green competence has increasingly focused on isolating the individual constituent dimensions of such specific competences. As a result, numerous scholarly reflections now indicate that green competence is a multidimensional construct encompassing six distinct dimensions (e.g. Abdelkareem et al., 2024; Cabral, Dhar, 2019; Yafi et al., 2021). These include green skills (e.g. Nurcholis et al., 2024), green behaviour (e.g. Farooq et al., 2022; Mirčetić et al., 2022), green attitudes (e.g. Gull, Idrees, 2022; Joshi, 2022; Liu et al., 2022), green abilities (e.g. Sudolska, 2022; Sudolska, Łapińska, 2023), and green awareness (e.g. Kozar, Sulich, 2023; Prasetyo et al., 2024). Such targeted research, as recognised by the authors of this article, is important from the perspective of business practice, as it can contribute to increased efficiency in the process of shaping green competence. The desired effect can be achieved through the targeted shaping of green competences in relation to a selected dimension or dimensions.

The issue of green competence is discussed in academic discourse in relation to various topics concerning both transport and logistics. For example, the shaping of green competence is explored in the context of implementing effective and efficient reverse logistics (Lee, Lam, 2012; López-Morales et al., 2015), as well as the role of green competence in the creation of

green supply chains (Burki et al., 2019; Kozar et al., 2024). It is also highlighted that the possession of green competencies by employees is crucial for the effective implementation of green supply chain management processes (Murad, Zou, 2024). The various dimensions of green competence mentioned above are also a key component of diverse academic considerations involving transport and/or logistics issues (e.g. Kozar et al., 2024; Leung et al., 2023; Polinori et al., 2018).

3. Research methodology

The study was planned and conducted between September and November 2024. The research activities undertaken, as outlined in the research schedule presented in Figure 1, were divided into four distinct stages. All research activities were carefully designed to facilitate a thorough, step-by-step analysis aimed at achieving the stated research aim. Consequently, it is not possible to identify any one research activity as more important than the others listed. These activities should, therefore, be regarded as equally significant in the process of obtaining the research results presented later in this article.

The first stage of the research focused on identifying the current research problem within the context of the transport and logistics industry. To this end, a review of scientific publications was conducted using the Google Scholar search engine, along with the Scopus and Web of Science databases. A search across these three databases, which contain bibliographic descriptions of scientific publications from various academic fields, revealed that issues related to the gradual green transformation of the economy are increasingly being addressed within the field of transport and logistics. In this context, the question of shaping employees' green competences occupies a central role. Based on the review, the authors of this article identified two key research issues. First, the process of shaping green competences is complex and multidimensional, due to the specific nature of the transport and logistics industry. Second, the shaping of green competences among employees in this sector can occur through the implementation of various sustainable development practices in the daily operations of transport and logistics entities. It was observed that some of these targeted practices are even referred to as green practices. Although the issue of shaping green competences in the transport and logistics industry has been addressed in the literature, this remains a relatively new and important area of scientific inquiry. In the authors' view, this area will continue to evolve in the coming years, both from the perspective of further research and from a practical standpoint, particularly in relation to the development and implementation of various sustainable or green practices.

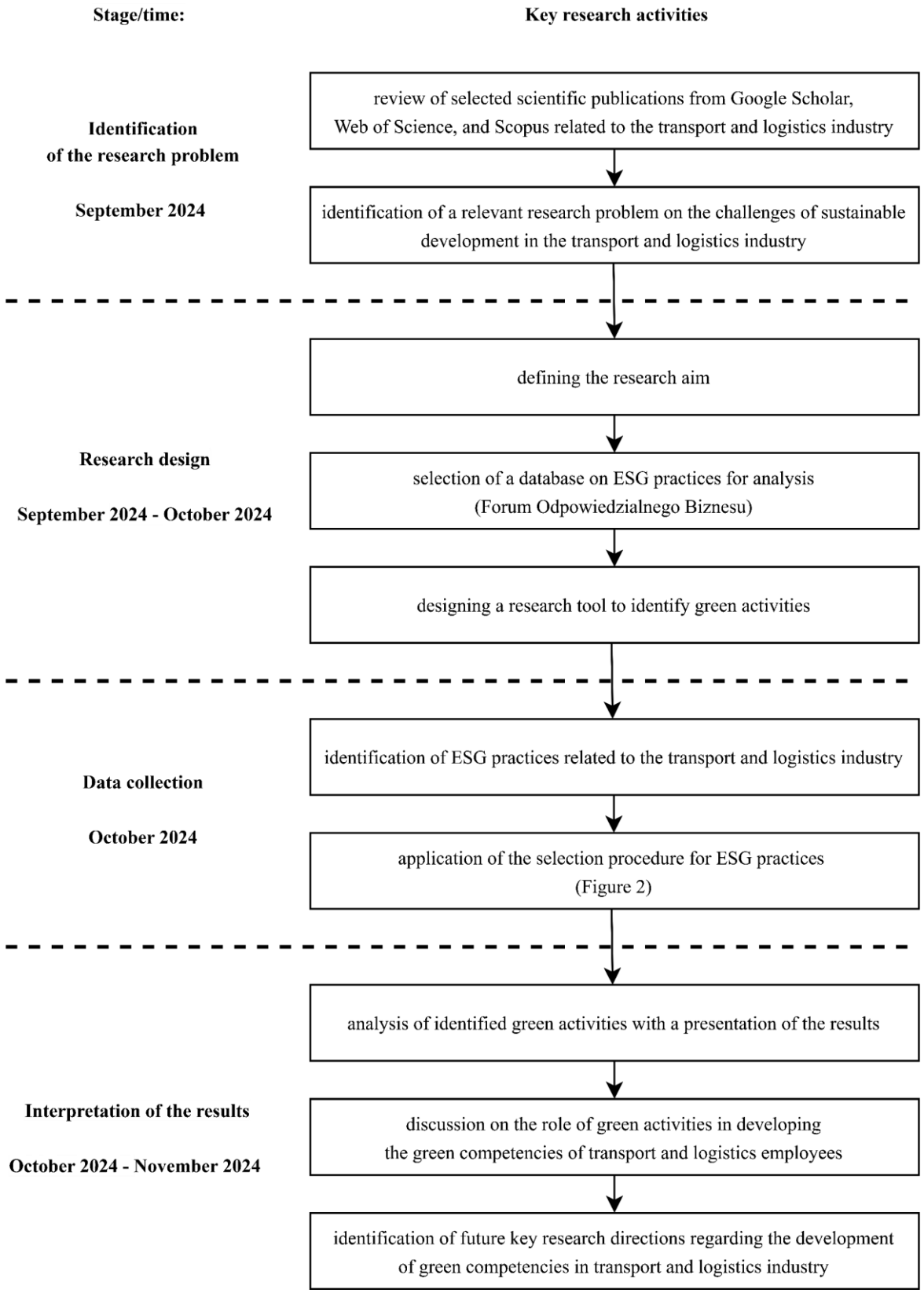

Figure 1. Stages of the research procedure and timeline.

Source: Authors' elaboration.

Conclusions from the first stage of the research and the availability of research material contributed to the development of key research assumptions, including the formulation of the research aim. Thus, it was determined that the aim of the research would be to identify the directions of shaping green competences in entities from the transport and logistics industry operating on the Polish market through the implementation of various types of green activities. The Forum Odpowiedzialnego Biznesu database, which contains descriptions of ESG practices from various industries (including transport and logistics), was selected for analysis due to its data collection period and the consistent manner in which the information is recorded. The best practices listed in this database underwent a selection process, which is also illustrated in Figure 2. In addition to identifying ESG practices within the transport and logistics industry, a screening process was carried out, which included an assessment of the consistency in recording all selected practices (the requirement to attribute at least one sustainable development goal, as outlined in Agenda 2030, within the database) and verification based on the presence of a green action. It was assumed that a given practice would be classified as a green practice if the solutions or practices implemented as a result of it contribute to reducing the negative impacts of economic activity on the environment. At the same time, in the interest of standardization and the replicability of future scientific inquiries, it was established that a green practice would occur when the implemented activities are consciously aimed at:

- reducing or eliminating plastic waste (A),
- rationalising water consumption (B),
- a reduction in the carbon footprint and overall reduction in air pollution through the improvement of individual processes within the business entity (C),
- the increased efficiency and more rational use of electricity (D),
- introducing solutions to enable or increase the use of energy from renewable sources in the energy mix (E),
- preserving biodiversity and actively promoting environmental protection and the creation of green spaces (F),
- segregation, recycling, or upcycling of waste (G),
- promoting greener commuting choices to and from the workplace (H),
- reduction of paper consumption (I),
- environmental education (J),
- zero waste policy and various types of collections aimed at exchange (K).

The criteria adopted and indicated above have made it possible to identify from among all the ESG practices collected in the Forum Odpowiedzialnego Biznesu database those that are simultaneously assigned to the transport and logistics industry and are characterised by the fact that they can be called green practices (green activities are implemented as part of them).

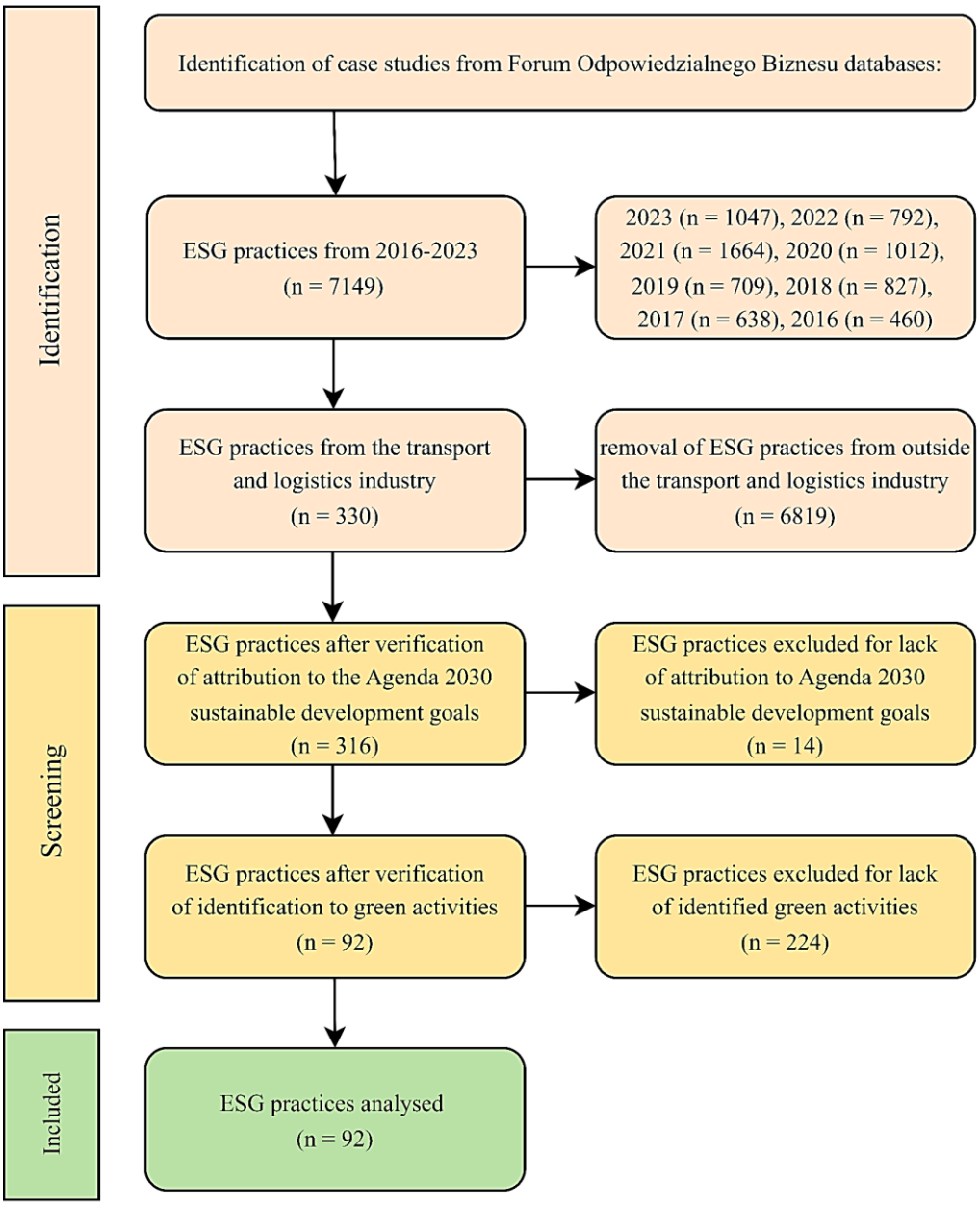

Figure 2. Research procedure for identifying ESG practices (green practices) for the study.
Source: Authors' elaboration.

The final stage of the research focused on analysing the results obtained from the examination of the 92 green practices identified in the transport and logistics industry. A detailed description of this stage, along with a discussion, is provided in the following part of the article. However, at this point, it is important to highlight the limitations of the study. The primary limitation lies in the selection of the ESG case study database that was analysed. Therefore, the results presented should be interpreted solely within the context of this database and cannot be generalised to sustainable or green practices in the transport and logistics industry in Poland as a whole. Another notable limitation is the author's approach to identifying green practices within the broader category of sustainable practices. These limitations, however, do not diminish the value of the analyses, as they demonstrate how green practices can be

distinguished from sustainable practices and how their role in shaping green competencies can be defined. Consequently, the analyses presented can serve as a valuable reference for other researchers who either employ different methods for extracting green practices or use entirely different ESG practice databases within the transport and logistics industry (including those based on the authors' own research). The methodology for identifying green activities can also be applied to studies of other economic sectors.

4. Results and discussion

A database of 92 identified ESG practices, for which at least one green activity was found to be in progress, and which could contribute to shaping the green competencies of employees, was created and analysed using VOSviewer software. This program is typically used to present bibliometric data across various fields, including those related to transport (e.g. Bao et al., 2023; Vengadesh et al., 2023), logistics (e.g. Nikseresht et al., 2024; Salas-Navarro et al., 2024; Vincek et al., 2023), and sustainable development (e.g. Wodnicka, Królikiewicz, 2024). However, the application of this software is much broader and also allows for the visualisation of data from qualitative analyses after appropriate aggregation. Thus, during the analysis of ESG practices, as indicated in the methodological section of this article, practices from the transport and logistics industry were assessed to determine whether any of the eleven measures were implemented that could indicate their "greenness". These individual measures, ranging from A to K, were assigned letters of the alphabet, which also facilitated clear visualisation of the data using VOSviewer software. The analysis conducted in this way aimed to visually map all the implemented measures that contributed to a practice being classified as green.

To generate a map visualising the co-occurrence of implemented green activities, the co-occurrence analysis panel selected co-occurrence (as the analysis type), full counting (as the counting method), and set the minimum number of occurrences of a keyword (in this case, activities A to K) to 1. This indicator value allowed the creation of a bibliometric map displaying all the implemented green activities, of which there were 187 in total across the 92 analysed practices. This also highlights that some of the green practices featured more than one implemented activity (Figure 3). It is also important to note that each area identified on the map, representing the visualisation of co-occurring green activities, is labelled in two ways and assigned exclusively to one of the two automatically generated clusters (either the red or green cluster). Each area is first identified by the letter corresponding to the activity in question (from A to K). Additionally, red or green dots of varying sizes can be seen, with the size of the dot reflecting the number of practices in which the activity was implemented (the larger the dot, the more green practices incorporated that activity).

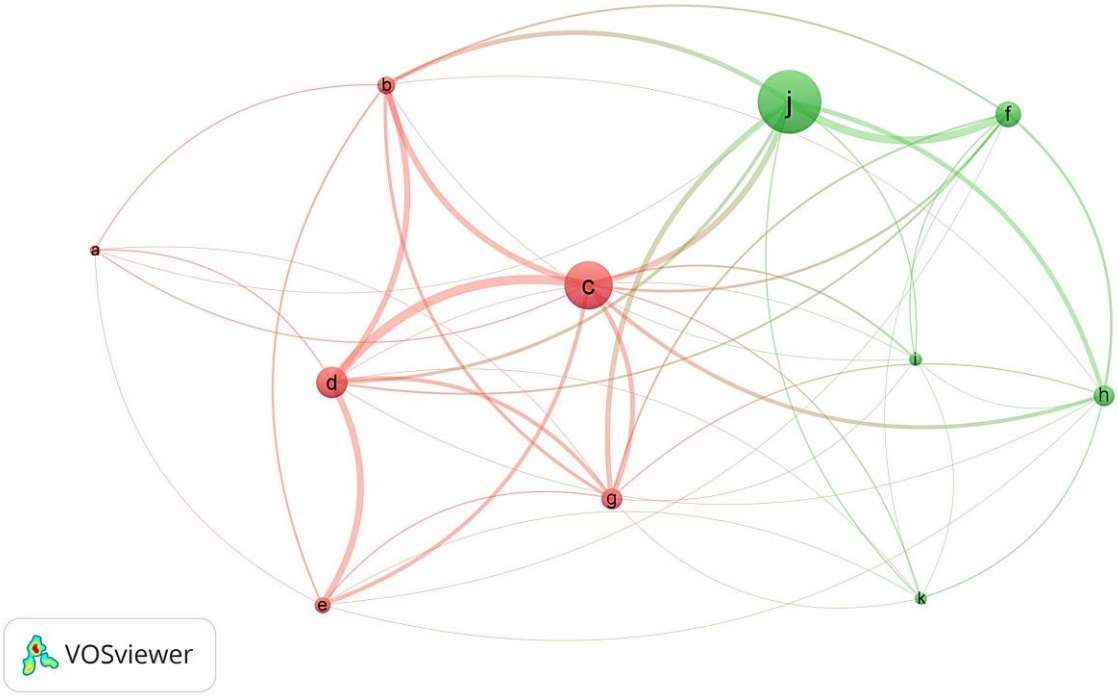

Figure 3. Network visualization of co-occurring green activities shaping green competences.
Source: Authors' elaboration in VOSviewer software (version 1.6.20).

To deepen the analysis, for each of the identified implemented green actions visualised in Figure 3, figures indicating occurrences and links were generated using VOSviewer software. These measures are shown in Table 1 in brackets next to each of the green actions labelled from A to K. The first measure in each bracket, links (L), represents the number of implemented green actions, as shown in the visualisation of the network of links, with which a given green action co-occurred at least once across all the analysed green practices. These connections are represented by the lines extending from each individual green action depicted. Since eleven green actions were analysed in the study, the maximum number of links could be 10. The second measure, occurrences (O), listed in Table 1, indicates the number of green practices in which a given green action was implemented. The maximum possible number of occurrences in the study could have been 92, reflecting the total number of green practices identified. However, no green action occurred in all of the identified green practices.

The research conducted showed that green activities C (red cluster), D (red cluster), and G (red cluster) were the only ones that co-occurred at least once in the analysed practices with all other green activities studied. These activities were characterised by specific measures or technological changes implemented within organisations, aimed at minimising the negative environmental impact of the respective economic entity. Simultaneously, these activities focused on changing employees' pro-environmental behaviour and raising their awareness in this regard. As a result, they were primarily targeted at shaping green behaviour and green awareness. In contrast, the most frequently referenced green activity in the analysed practices was the green J-action (green cluster). Environmental education contributes to shaping the

green knowledge of individual employees working in the transport and logistics industry. Additionally, such targeted measures can be implemented to a greater extent by a larger number of actors, compared to the implementation of often costly organisational or technological changes, such as those aimed at introducing green innovations in these areas.

Table 1.
Green activities co-occurrence clusters displayed in Figure 3

Cluster	Color	Keywords
1	red	A (L = 6, O = 7); B (L = 9, O = 12); C (L = 10, O = 32); D (L = 10, O = 21); E (L = 8, O = 11); G (L = 10, O = 14)
2	green	F (L = 9, O = 17); H (L = 9, O = 14); I (L = 8, O = 9); J (L = 9, O = 42); K (L = 8, O = 8)

green action aimed at:

A	reducing or eliminating plastic waste
B	rationalising water consumption
C	a reduction in the carbon footprint and overall reduction in air pollution through the improvement of individual processes within the business entity
D	the increased efficiency and more rational use of electricity
E	introducing solutions to enable or increase the use of energy from renewable sources in the energy mix
F	preserving biodiversity and actively promoting environmental protection and the creation of green spaces
G	segregation, recycling, or upcycling of waste
H	promoting greener commuting choices to and from the workplace
I	reduction of paper consumption
J	environmental education
K	zero waste policy and various types of collections aimed at exchange

Source: Authors' elaboration in VOSviewer software (version 1.6.20).

The analyses carried out showed that green competences were shaped by different types of green actions implemented in individual green practices. In more than 55% of the green practices, two or more green activities implemented were identified, as shown in Figure 4. At the same time, it should be noted that in most of these cases two different activities were implemented simultaneously through a given green practice. In one of the analysed practices, eight different green activities were identified, which at the same time represents the highest number of such activities implemented simultaneously through a single practice. The multidirectional shaping of green competences through different green activities should be considered very important, as it can contribute to building different dimensions of such specific competences.

Through the prism of the analysed green practices and the green actions identified within their scope, the authors of this article observed that green competences can be shaped both directly and indirectly. In the case of direct shaping of green competences, employees actively participate in a given green activity (they may be its initiator and/or participant). In contrast, with indirect shaping of green competences, employees are not actively involved in the implementation of a given green action (they are merely observers of the results and are aware of the entity's sustainable, or less frequently green, orientation where they are employed). Given this distinction in how green competences can be shaped, the authors suggest that managers in transport and logistics entities should focus on maximising practices aimed at

directly shaping green competences. Direct involvement of employees in the implementation of a given green action, in the authors' view, can help consolidate relevant green patterns of attitudes and behaviours, thereby fostering a sense of ownership over these actions. In cases where employees are only observers of green changes, which are not actively communicated to them, even with appropriate training, the formation of green competences may not occur. In such situations, employees may view the changes as alien, incomprehensible, or external, hindering the internalisation of green practices.

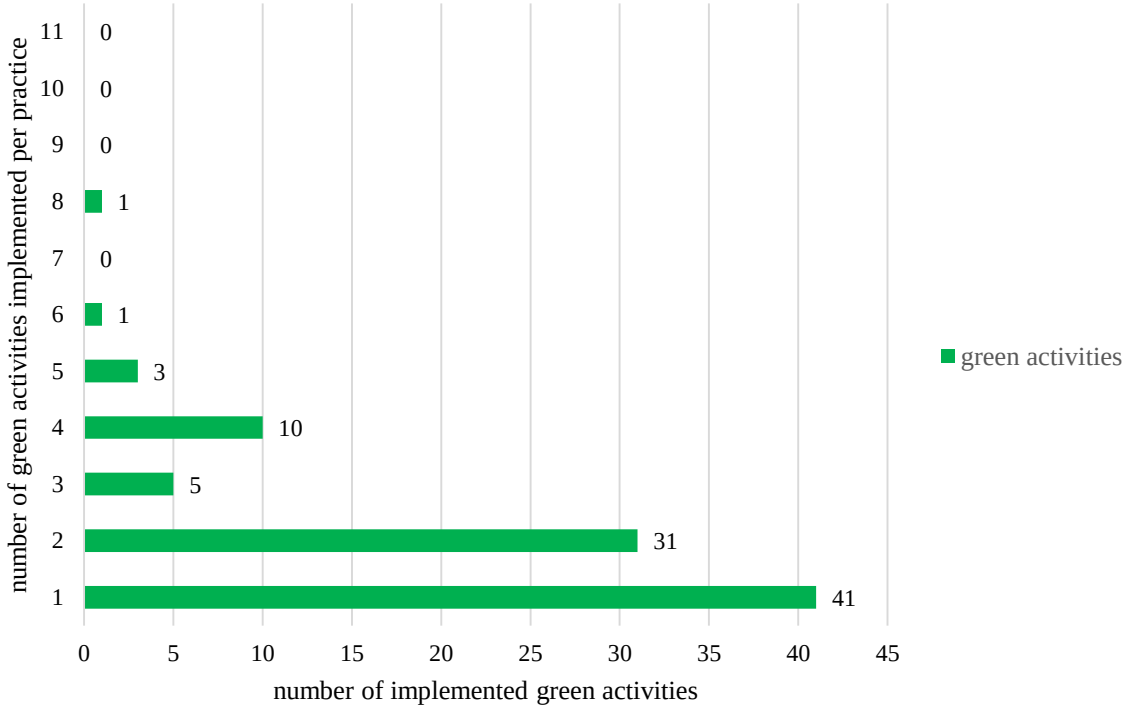

Figure 4. Number of green activities aimed at shaping green competences within a single green practice. Source: Authors' elaboration.

In terms of the green measures implemented in individual entities, it is evident that there is still insufficient emphasis on initiatives aimed at reducing or eliminating plastic waste, adopting a zero waste policy, and implementing various types of collections for replacement, as well as measures to reduce paper and water consumption. In the opinion of the authors of this article, those responsible for shaping the green competences of employees should focus on such practices, which, while not necessarily spectacular in the media, can gradually change employees' environmental behaviour and, most importantly, can be easily introduced within individual organisations, often without incurring additional costs.

The green measures identified in this study are discussed in various types of research, including studies in industries outside of transport and logistics, which focus on the development of green knowledge, green skills, green behaviour, green attitudes, green abilities, and green awareness. At the same time, it should be noted that the implementation of some of the green measures observed in this study depends on factors external to the organisation.

These include the availability of new technologies, such as innovative green technologies (e.g. Kharb et al., 2024; Wang et al., 2022), and the availability of adequate infrastructure, such as a well-developed public transport system that supports greener commuting choices. Therefore, in order to effectively shape some of the green attitudes, it is essential for managers in individual transport and logistics companies to collaborate with decision-makers who influence the development of public transport in their areas. Only through such collaboration can intelligent and sustainable transport systems be achieved, which are increasingly the focus of scientific discourse. For instance, issues related to sustainable transport solutions in urban areas (e.g. Bhellar et al., 2023; Podgórniak-Krzykacz, Przywojska, 2023) or the development of public bicycle systems (e.g. Frade et al., 2022; Podgórniak-Krzykacz et al., 2022; Torres et al., 2024) are actively being discussed. In this context, it should be noted that the green measure aimed at promoting greener commuting choices includes not only carpooling but also encouraging employees to use public transport more frequently or to choose a bicycle instead of a car.

Developing solutions aimed at shaping green competence is undoubtedly a critical challenge for managers of transport and logistics operators, who are already grappling with the gradual green transformation of the economy. For instance, there is a noticeable increase in environmental awareness among consumers, leading to the emergence of a new category of consumers, often referred to as green consumers (e.g. Borah et al., 2024; Young et al., 2010). As the authors of this article acknowledge, these consumers expect green services of adequate quality from the transport and logistics industry. Consequently, future research should focus on identifying which green competences should be developed among transport and logistics professionals, particularly in light of the growing importance of the green consumer. This consumer not only considers the characteristics of the goods they purchase but also the manner in which these goods are delivered.

From the perspective of future research, a qualitative assessment of the green competences of workers in the transport and logistics industry should also be conducted. This study should be approached from multiple perspectives, including those of managers, employees, and consumers. Additionally, it would be valuable to explore whether the development of green competences among employees leads to the creation of green jobs in the transport and logistics industry, and if so, to what extent.

Another important area for future research on shaping green competences in the transport and logistics industry should focus on measuring the so-called green competence gap. The issue of the green competence gap and how to measure it is already being explored in the literature (Nikoloski et al., 2024; Pavlova, 2018). Therefore, it is becoming increasingly crucial to develop appropriate measurement tools that are both easy to apply and cost-effective for individual business entities. This would enable transport and logistics operators to effectively manage their employees, consciously shape their green competences, and mitigate the negative impact of the green competence gap on the functioning of the green supply chain.

5. Summary

The study presented here differs from previous research in that it starts by identifying green practices and the green actions associated with them as the foundation for discussing the shaping of green competences. Furthermore, the use of VOSviewer software to analyse the co-occurrence of green actions within green practices allowed for a more comprehensive understanding of the complexity of this issue.

The study identified eleven green activities that can shape various dimensions of green competence. A particular emphasis was placed on the positive impact of direct employee involvement in individual green activities on the development of green competences. Additionally, it was noted that environmental education continues to play a significant role in shaping these competences. However, the authors believe that managers of transport and logistics operators should consider implementing training programs tailored to each generation, as this would enhance their effectiveness. Furthermore, modern training techniques, including the use of gamification, should be incorporated more frequently to improve knowledge delivery.

As indicated, the green transformation of the economy, which is gradually taking place, is becoming a challenge for those responsible for the management of entities in the various sectors of the economy. Thus, the development of research aimed at identifying the role and importance of shaping green competences on the functioning of the transport and logistics industry should be considered inevitable. However, it is already possible to point out that the direction of green in the transport and logistics industry will imply the necessity to continuously improve the level of green competences held by employees in order to follow the expectations of, for example, increasingly green-oriented consumers.

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