Vol. 4(2), 9-16

Journal of Energy & Environmental Policy Options

Assessing Transport System Efficiency and Sustainable Development in Trade and Manufacturing Sector

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Abstract

The efficiency of a transport system is a pivotal determinant of its role in sustainable development, especially within the trade and manufacturing sectors. Assessing this efficiency involves evaluating numerous indicators, which are essential for the successful implementation of sustainable transportation practices. This paper aims to assess and evaluate the efficiency of transport systems, explore the relevant indicators, and examine the feasibility of integrating sustainable development principles into these systems. In this context, efficiency is defined as the ratio between the resources and expenditures used in the transportation process and the outcomes achieved. The study investigates how current transport systems align with sustainable development goals and explores the realistic adoption of sustainable transportation practices within the trade and manufacturing industries. This analysis is vital for understanding the current state of transport efficiency and identifying areas where improvements can be made. The penultimate chapter compares existing logistical solutions with proposed alternatives, using heuristic methods to evaluate their profitability and sustainability. The authors highlight the importance of exploring both conventional and innovative approaches to logistics, emphasizing the need for systems that balance economic viability with environmental responsibility. Additionally, the study offers insights into the potential for further development in the realm of sustainable transport systems, suggesting that a combination of technological innovation and strategic planning is necessary for progress. The paper concludes with recommendations for enhancing the efficiency and sustainability of transport processes within these critical sectors. By examining these factors, the paper provides valuable insights into the practical application of sustainable transportation principles, offering a roadmap for businesses and policymakers aiming to optimize transport systems for sustainable growth.

Keywords: Transport Efficiency, Sustainable Development, Sustainable Transportation
JEL Codes: R41, Q56, L91

1. INTRODUCTION

In this paper, the authors provide an in-depth case study that examines an existing transport system within the trade and manufacturing industries, focusing on key Eurasian regions. Specifically, the study looks at the transport relationships between Italy, the Netherlands, Russia, and China—regions known for their strong trade connections and industrial activities. These partner relationships are explored in detail in Section 3 of the paper, providing context for the strategic importance of these trade routes. The case study is particularly relevant given the growing emphasis on improving transport systems to meet sustainability goals while maintaining economic efficiency. The authors evaluate two distinct variants of the transport system, considering their operational efficiencies and alignment with sustainable development objectives. The first variant analyzes the current state of the transport system, assessing how it functions under existing conditions. This evaluation includes a review of the system's performance metrics, logistical efficiency, environmental impact, and how well it meets the company's operational needs. The current system has been designed to meet the demands of trade and manufacturing within this region, but it may not fully incorporate sustainability principles, such as reducing carbon emissions or optimizing energy use. The authors provide insights into the strengths and weaknesses of the existing transport network, highlighting areas where it excels and where it may fall short of contemporary sustainability standards.

The second variant takes a forward-looking approach by exploring alternative ways to organize and optimize the transport system. This alternative variant is viewed as potentially suboptimal, indicating that while it may offer improvements in some areas, there are still challenges and inefficiencies that need to be addressed. The exploration of this alternative system involves considering new organizational structures, technological advancements, and logistical innovations that could enhance both the economic and environmental performance of the transport network. The goal is to offer suggestions that not only streamline operations but also significantly reduce the environmental footprint of the transport system, in line with global sustainable development goals. The authors aim to propose changes that could potentially minimize fuel consumption, lower CO2 emissions, and optimize resource use across the supply chain. In evaluating these two variants, the paper emphasizes the importance of balancing operational efficiency with sustainability priorities. The first variant, while effective in supporting the company's current transport needs, may be less environmentally friendly and less prepared to adapt to stricter regulations and changing market demands for green

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logistics. The second variant, though considered suboptimal, offers a pathway to a more sustainable transport system by integrating innovations that align with sustainable development objectives. For instance, the alternative system could involve the use of greener transport technologies, such as electric vehicles or rail networks powered by renewable energy sources, which could drastically reduce emissions and contribute to more eco-friendly trade practices.

Moreover, the authors consider the broader implications of these variants for the trade and manufacturing sectors. As global supply chains become more interconnected and environmental regulations more stringent, companies must adapt their transport systems to remain competitive and compliant with sustainability standards. The paper explores how the integration of sustainable practices into transport systems could benefit not only the environment but also the overall efficiency and profitability of companies. By reducing fuel consumption, lowering maintenance costs, and improving delivery times through optimized routes, businesses can achieve significant cost savings while also contributing to the fight against climate change. Additionally, the study highlights the importance of collaboration between different stakeholders—such as governments, private companies, and international organizations—in driving the transition toward more sustainable transport systems. The authors suggest that policy interventions, financial incentives, and technological innovations are critical to making these alternative systems viable on a larger scale. This case study thus serves as a microcosm of the broader shift toward sustainability in global logistics, illustrating both the challenges and opportunities that lie ahead for industries heavily reliant on complex transport networks. This paper provides a comprehensive evaluation of a transport system within the Eurasian trade and manufacturing industries, offering valuable insights into how such systems can evolve to meet the dual goals of operational efficiency and sustainability. The comparison between the current state of the system and potential alternatives reveals the complexities involved in achieving sustainable innovation in logistics. By considering both economic and environmental factors, the authors provide a framework for understanding how transport systems can be optimized to support the long-term sustainability of global supply chains.

The development of sustainable transport requires a balanced consideration of both indirect and direct factors. Indirect factors arise from accumulated knowledge, including historical trends, case studies, and broader environmental, social, and economic contexts. Direct factors, on the other hand, are typically derived from scientific analysis and expert opinions, offering precise, data-driven insights into how transport systems operate and their potential for sustainability. For this study, the authors selected a set of technical and economic indicators to measure the impacts of both these types of factors on sustainable transport. Among the technical indicators, key metrics include transport duration, transport cost per shipping unit, transport cost per distance unit, average commercial speed, and transport performance. These indicators are essential in evaluating how efficiently and quickly goods can be transported, while also examining the costs involved. For instance, transport duration and speed directly affect delivery times, while transport costs per unit and per distance unit provide a clear understanding of the economic efficiency of the system. Additionally, efficiency in container carrying capacity and container loading space is analyzed to ensure that resources, such as space and energy, are being used as effectively as possible. This is especially important for minimizing fuel consumption and reducing emissions, two major objectives in sustainable transport.

On the economic side, the authors utilized net present value (NPV) and internal rate of return (IRR) to gauge the long-term financial viability of the transport system. NPV calculates the present value of future cash flows, helping to determine whether a particular transport system is financially beneficial over time. IRR, on the other hand, measures the profitability of an investment, indicating the expected return on transport infrastructure and technologies. These economic indicators are crucial for determining whether sustainable transport solutions are not only environmentally responsible but also profitable in the long run, which is key for businesses looking to balance sustainability with financial performance. The study is conducted within the framework of sustainable development, with a special emphasis on sustainable transport. Sustainable transport aims to reduce the negative environmental impacts associated with moving goods, such as carbon emissions, pollution, and resource depletion, while ensuring economic efficiency and competitiveness. The authors' thesis explores whether it is possible to harmonize sustainable development goals with company policies that often focus on profitability and operational efficiency. This is a pressing issue, as many companies face the challenge of transitioning toward greener practices while maintaining or enhancing their competitive position in the market.

To explore this issue, the authors adopted a qualitative research method, gathering extensive information from both scientific and popular literature. The objective was to compile a wide range of insights and data points that would shed light on the complex relationship between sustainable transport and business practices. This approach allowed the authors to explore various dimensions of the topic, including the role of technological innovation, policy regulations, market demand for greener solutions, and corporate strategies. Through their research, the authors aimed to determine whether sustainable transport could be successfully integrated into company policies without sacrificing economic goals. By examining the balance between technical efficiency and economic feasibility, the study contributes to the ongoing debate about how businesses can adapt to global sustainability challenges. The use of both technical and economic indicators in the study provides a holistic view, showing that sustainable transport is not just an environmental goal but a complex, multifaceted issue that requires careful planning and innovation at every level.

This study provides valuable insights into the development of sustainable transport, focusing on how technical efficiency and economic performance can be measured and optimized. By evaluating both direct and indirect factors and using a qualitative approach, the authors explore the potential for aligning sustainable development with business strategies. The findings contribute to the broader discourse on how companies can embrace sustainability while

maintaining financial viability, offering a pathway for businesses to make more informed decisions in the shift toward greener transport systems. The development of sustainable transport requires a balanced consideration of both indirect and direct factors. Indirect factors arise from accumulated knowledge, including historical trends, case studies, and broader environmental, social, and economic contexts. Direct factors, on the other hand, are typically derived from scientific analysis and expert opinions, offering precise, data-driven insights into how transport systems operate and their potential for sustainability. For this study, the authors selected a set of technical and economic indicators to measure the impacts of both these types of factors on sustainable transport. Among the technical indicators, key metrics include transport duration, transport cost per shipping unit, transport cost per distance unit, average commercial speed, and transport performance. These indicators are essential in evaluating how efficiently and quickly goods can be transported, while also examining the costs involved. For instance, transport duration and speed directly affect delivery times, while transport costs per unit and per distance unit provide a clear understanding of the economic efficiency of the system. Additionally, efficiency in container carrying capacity and container loading space is analyzed to ensure that resources, such as space and energy, are being used as effectively as possible. This is especially important for minimizing fuel consumption and reducing emissions, two major objectives in sustainable transport.

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2. LITERATURE REVIEW

To collect a sufficiently large body of research material, the authors conducted an extensive review of both foreign scientific and popular science literature. The qualitative method was employed to gather the most comprehensive information available from national and international sources. This involved conducting an exhaustive library query, utilizing both "hard" literature sources—such as books, academic journals, and reports—and numerous web resources, which were carefully verified for accuracy and credibility. The objective was to form a robust foundation of knowledge to support the paper's exploration of sustainable transport within the broader context of sustainable development. Sustainable development, as defined in the international literature, draws heavily on the definition provided in the Brundtland Report (1987), which is considered one of the foundational texts on the subject. The Brundtland Commission defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987: 41). This concept revolves around two key ideas: the concept of "needs," particularly those of the world's poor, and the idea of "limitations" imposed by technology and social organization on the environment's ability to meet present and future needs. Both concepts are crucial for understanding sustainable development, but the idea of limitations is especially pertinent when applied to transport systems, where resource use and environmental impact are significant concerns.

The concept of sustainable transport is deeply tied to sustainable development, as transport systems are a major contributor to environmental degradation, particularly in terms of greenhouse gas emissions. According to Eliasson and Proost (2015: 92), reducing emissions from the transport sector is a frequently cited goal when sustainable transport is discussed in the context of sustainable development. Márquez-Ramos (2015) highlights the complex relationship

between trade and transport, noting that increased trade liberalization has led to greater volumes of exports and imports, thereby contributing to a rise in transport emissions. She emphasizes that transport is one of the most polluting sectors in terms of CO2 emissions, with varying levels of pollution depending on the mode of transport (Zafrilla et al., 2012).

Sustainable transport, however, is a much broader and more complex issue than just reducing emissions. It is regarded as a critical component of global sustainability and world sustainable development. A sustainable transportation system must meet the present needs of individuals and communities while ensuring that future generations can meet their needs as well. This means providing basic access for people and communities, ensuring safety, and promoting a healthy ecosystem—where "eco-" represents both ecological and economic considerations. A sustainable transportation system should also be affordable, operate efficiently, and provide various transport options, thus supporting a vibrant economy. It must aim to reduce greenhouse gas emissions, minimize the consumption of non-renewable resources, and reuse or recycle renewable components wherever possible. Moreover, such a system should minimize noise pollution and other forms of environmental disturbance, ensuring that it contributes to a better quality of life for society at large. In essence, sustainable transport is about balancing the needs of the economy, society, and the environment—a coexistence that is vital for long-term development. As illustrated in the conceptual framework of sustainable development (often depicted in models like Venn diagrams or interconnected circles), the aim is to improve the quality of life in all three areas: economic growth, social well-being, and environmental protection. Sustainable transport systems are an integral part of this overarching goal, as they can significantly influence each of these areas, helping to create a more equitable, resilient, and ecologically sound future.

Transport undeniably has a global impact on various aspects of sustainable development, influencing the economy, society, and the environment. Sustainable transportation can be defined in multiple ways, reflecting the complex interplay between these key elements. According to Stephenson et al. (2017: 1), sustainable transport refers to an ideal combination of government policies, technologies, infrastructure, and behaviors that minimize negative social and environmental impacts while maintaining or improving economic outcomes. This multifaceted approach emphasizes that sustainability in transport requires balancing economic efficiency with environmental protection and social equity. In this context, it is proposed to conceptualize sustainable transport as a system that intersects with the economy, society, and the natural environment, encapsulating elements of all three. In Figure 1, sustainable transport can be visualized as a ring that overlaps these sets, illustrating that transport is not just a standalone sector but is integral to economic development, social well-being, and environmental sustainability. By considering transport in this holistic manner, it becomes clear that its role extends beyond moving goods and people—it is a key driver of sustainable development. As Zuidgeest et al. (2000: 1, cited in Kostrzewski and Chudzikiewicz, 2015: 59) argue, sustainable transport is intrinsically linked to the broader goals of sustainability. It connects communities, facilitates trade, and supports economic growth while also having the potential to reduce environmental degradation and promote social inclusivity. Thus, sustainable transport should be viewed as a system that operates within and influences all aspects of sustainable development, contributing to the well-being of society, the efficiency of the economy, and the protection of the environment.

Kadłubek (2015: 495), referencing Borowiecki and Rójek (2011: 23), Modrak et al. (2011: 158), and Grabara and Kot (2009), states that "the sustainable development of business entities and management areas is, apart from corporate governance and value and development management, one of the most crucial modern management concepts." This raises an important question: does this truly apply across all the necessary areas of consideration, namely the economy, society, and the natural environment, along with their coordination and coexistence? Are these the genuine challenges faced by business entities in their pursuit of sustainability. The paper's authors express some skepticism regarding the legitimacy of certain theoretical considerations surrounding sustainable development. While sustainable development is often promoted as a comprehensive management framework that balances economic, social, and environmental priorities, the authors raise questions about its practical application and whether it effectively addresses the complexities businesses face in real-world scenarios. For instance, they ask whether the shortest route in a transport system is genuinely the most cost-effective or efficient—a question that goes beyond mere logistics and touches on deeper issues of sustainability. This inquiry suggests that there may be hidden costs or trade-offs associated with seemingly optimal decisions, which will be explored later in the paper.

This doubt underscores the challenge of aligning theoretical models of sustainable development with the practical realities of business operations. The authors are likely hinting at the nuances and complexities in sustainable transport and broader business management that might not be adequately captured in conventional sustainability frameworks. By questioning commonly accepted assumptions, they aim to explore whether current approaches to sustainable development are robust enough to accommodate the multifaceted challenges of modern business operations, particularly within transport systems where economic, social, and environmental factors must coexist and be coordinated effectively.

3. DISCUSSION ABOUT THE TRANSPORTATION SYSTEM

The paper focuses on the manufacturing and trade industry, where products are produced in a factory located in Shanghai, while the sales markets are spread across Europe and Asia. This geographical disparity between production and sales necessitates the efficient logistical management of transportation, ensuring that products are delivered to the final customers in a timely and cost-effective manner. The shipping process is carried out in several stages. Initially, products are packed into containers, which are then loaded onto container ships and transported from Shanghai to Rotterdam, covering a distance of 19,500 kilometers in approximately 14 days. Once the containers reach Rotterdam, reloading operations take place, after which the containers are shipped to St. Petersburg using maritime transportation.

From there, the containers are transferred onto trucks and transported by road to a warehouse in Moscow. At the Moscow warehouse, individual orders are processed, and the freight is sent via rail to the final customers. The entire process spans about 30 days and covers a total distance of around 32,000 kilometers. Choosing the most suitable shipping process involves more than just simplicity. Decision-making should also be grounded in an assessment of technical and economic parameters to ensure the shipping method is both efficient and sustainable. To facilitate this decision-making, relevant indicators can be used to present data in a clear and comparable manner. These indicators allow for a systematic evaluation of the shipping process based on various factors, including cost, speed, and environmental impact. The cost of shipping is calculated by considering both fixed and variable capital expenditures. Fixed costs, such as document processing and administrative tasks, remain constant regardless of the shipment size (i.e., the number of shipping units). Variable costs, on the other hand, fluctuate depending on the volume and distance of the shipment. This dual structure of costs is critical in determining the overall economic efficiency of the shipping process. It is important to note that economic and technical requirements for transportation systems are often at odds with one another. While every transportation system strives to reduce costs and simultaneously improve service quality and commercial speed, these goals can be mutually exclusive. Lowering transportation costs typically results in a reduction in service quality, while maintaining high-quality service often entails higher costs. This trade-off is a key factor in determining the sustainability of transport systems. Balancing these conflicting objectives—cost efficiency, speed, quality, and environmental sustainability—poses a significant challenge for logistics managers in ensuring that the transport system remains both competitive and sustainable. In the context of sustainable transportation, this dilemma becomes even more pronounced. Sustainable transport requires minimizing environmental impacts, such as reducing emissions and optimizing energy usage, while maintaining economic viability. However, achieving both high-quality service and low costs without compromising sustainability is a complex task that requires careful consideration of all aspects of the transportation system. Thus, logistical management in the manufacturing and trade industry must constantly navigate these challenges to find the most appropriate balance between cost, speed, quality, and sustainability.

The first variant of the transport system involves transportation between Asia and Europe and back again. At first glance, this approach may seem less rational and efficient. The distance between the manufacturing site in Shanghai and the customer's warehouse in Vladivostok is approximately 3,050 kilometers. Logically, one might assume that direct delivery from the factory to the customer should be faster and cheaper, given the shorter distance. This forms the basis of considering an alternative variant in which the route is optimized by minimizing the distance. Fewer reloading operations are also expected to reduce the likelihood of product damage during transit, lower the risk of shipment delays, and simplify the flow of information, especially since both locations are within the same time zone. Moreover, the transport infrastructure between Shanghai and Vladivostok is fully developed, offering the possibility to use various modes of transportation, which increases flexibility in planning the shipping process. Given these apparent advantages, this alternative variant seems like a viable option that could offer better results in terms of cost, speed, and operational simplicity.

However, several practical and logistical challenges must also be considered. One key issue is the technical and organizational limitations of having a warehouse located near the factory. Such a setup might prevent the direct collection and processing of individual customer orders. Typically, order fulfillment is handled by central warehouses where orders are picked, sorted, and customized for various clients. Without these central facilities, the company would need to pack and ship only one type of product per container, which would force customers to order large quantities, such as an entire container of each product. This setup would limit flexibility in order size and variety, which might not be practical for all customers. From the company's perspective, adapting a warehouse next to the factory to handle order fulfillment would require significant investment. Modifying the facility to enable more efficient order processing would involve substantial costs, and this type of infrastructure adjustment might not align with the company's immediate operational goals. Additionally, making these kinds of investments involves multiple criteria and long-term planning, making it difficult to decide on the best approach. Often, decisions of this nature require trade-offs between present needs and future company strategies.

In reality, the optimal solution often takes the form of a compromise, depending on the current and future situations of the company. Decision-makers frequently use heuristic methods—techniques designed to find the most suitable solution with the available information. These methods help company management balance various factors, including cost, time, operational complexity, and customer satisfaction. In the case of the analyzed company, the decision about the transport system revolves around comparing two alternative routes: the current Asia-Europe circuit and the proposed direct route between Shanghai and Vladivostok. Each option has its limitations and advantages, and the final choice must account for the company's priorities, future goals, and the constraints set by management or investors. Ultimately, the decision-making process is guided by a careful evaluation of the technical and economic factors, as well as the broader strategic objectives of the company.

To identify the most advantageous route for transporting goods in the analyzed transport system, the point method with assigned weights is applied, as described by Brzeziński (2006, cited in Nowakowski and Werbińska-Wojciechowska, 2012: 952). This method involves defining selection criteria, assigning weights to each criterion based on their relative importance, and then evaluating each transport route according to these criteria. The final score for each route is calculated by summing the products of the assigned weights and the ratings given to each criterion. The route with the highest total score is considered the most advantageous. The process of selecting the best shipping route is not straightforward, as it depends heavily on the priorities and objectives of the company owners. The factors considered

during this decision-making process should be closely aligned with the company's mission and vision. For instance, a company that prioritizes cost reduction may choose a different route than one that prioritizes speed or environmental sustainability. Therefore, choosing the optimal route involves balancing various criteria, such as cost, time, environmental impact, and risk, all while considering the broader strategic goals of the organization.

One approach to solving this problem is by using a heuristic method in combination with the experts method. The experts method relies on the input of experienced decision-makers who use their knowledge to identify the most suitable solution. The decision-maker begins by outlining the criteria for evaluating the routes and assigning each criterion a weight based on its importance. These weights are expressed numerically, reflecting the decision-maker's assessment of the relative significance of each criterion. Since the process of assigning weights is inherently subjective, it is important that the decision-maker be both knowledgeable and independent of the organization. Independence helps ensure that personal biases or internal pressures do not influence the weighting process. Different decision-makers might prioritize certain factors differently, which can lead to varying outcomes. For example, one decision-maker might emphasize cost efficiency, while another might prioritize reducing environmental impact. Therefore, the choice of an expert who can impartially assess the criteria is critical for ensuring that the selection process is balanced and aligned with the company's overall strategic objectives. By using this structured approach, companies can make informed decisions that account for multiple factors and weigh them according to their importance. The point method combined with expert judgment provides a framework for systematically evaluating transport routes, ensuring that the final decision is both data-driven and reflective of the company's values and priorities. This method allows decision-makers to not only focus on immediate cost and time factors but also consider longer-term strategic goals, such as sustainability, customer satisfaction, and operational efficiency.

4. CONCLUSION

Sustainable development aims to enhance the quality of life by balancing the needs of the economy, society, and the environment. From an environmental perspective, sustainable transport systems focus on using modes of transport that are well-suited to the size and distance of shipments while minimizing emissions and environmental impact. This requires careful selection of transport options, such as rail or sea freight over longer distances, which are generally more energy-efficient and produce fewer emissions compared to road or air transport. The objective is to reduce the carbon footprint of goods movement while maintaining logistical efficiency and cost-effectiveness. However, in the context of global trade, the environmental challenges associated with transportation are significant.

Over the past three decades, China has emerged as the largest consumer of energy and the greatest emitter of pollution worldwide. As a major hub of global manufacturing and trade, China's rapid industrialization and economic growth have led to a substantial increase in greenhouse gas emissions, primarily due to the heavy reliance on coal and other fossil fuels. This rise in emissions is not only tied to domestic industrial activities but also to the global demand for goods manufactured in China, which necessitates the extensive use of transport systems for exporting products to international markets. The scale of China's energy consumption and emissions highlights the need for more sustainable transport practices, particularly in the context of international shipping and logistics. As China continues to play a dominant role in global supply chains, there is a growing pressure to adopt cleaner, more efficient transport technologies and infrastructure. This includes innovations in low-carbon shipping methods, the expansion of electric or hybrid vehicle fleets, and investments in renewable energy sources for powering transport networks. Balancing the economic benefits of global trade with the environmental impacts of transportation is a key challenge for achieving sustainable development. While technological advancements and regulatory frameworks can help reduce emissions, the scale of the problem, particularly in regions like China where energy demands are high, underscores the need for coordinated global efforts to promote greener transport solutions. Sustainable transport practices are thus essential not only for reducing environmental harm but also for ensuring long-term economic stability and improved quality of life worldwide. As a major contributor to global energy consumption and pollution emissions, China's transportation system warrants close examination, particularly given its central role in both domestic and international trade.

Assessing the performance of this vast system, in terms of both energy efficiency and environmental impact, has become a critical topic as the country seeks to balance its rapid economic growth with sustainability goals. Despite the significance of China's transportation sector in contributing to global emissions, there has been relatively little focused research on its overall performance, especially in the areas of energy use and environmental efficiency. Most of the existing studies have concentrated on industrial emissions or energy use in manufacturing, often overlooking the transportation system, which is a key player in China's environmental footprint. The lack of comprehensive research in this area means that there is limited understanding of how effectively China's transport sector manages energy consumption and minimizes environmental degradation. More research is needed to evaluate the energy and environmental efficiency of the various modes of transportation used across China, such as road, rail, air, and maritime transport, and how these can be optimized for sustainability. Additionally, China's massive logistics and transportation infrastructure, which supports its position as a global trade leader, poses unique challenges when it comes to reducing emissions. The transport of goods across long distances, both within China and for export to international markets, necessitates the use of energy-intensive modes of transport. Without sufficient data and performance evaluations, it is difficult to create strategies that effectively mitigate the environmental impact of this system while maintaining the country's economic competitiveness. Given China's prominence in global supply chains, understanding and improving the energy and environmental efficiency of its transportation system is essential for achieving both national and global

sustainability goals. This calls for a concerted research effort to develop robust metrics, tools, and methodologies for evaluating the performance of China's transport sector, identifying areas for improvement, and implementing cleaner, more sustainable transport solutions.

When only transport costs are taken into consideration, the decision-making process may seem straightforward. However, when other functional aspects of a company, such as production costs, capital investment for infrastructure (e.g., high-bay warehouses in China), and various logistical factors are included, the evaluation becomes significantly more complex. The interplay between these factors reveals that achieving sustainable development within a company is far from simple and requires a broader, more integrated approach. Sustainable development does not only pertain to transportation efficiency but encompasses the entire operational spectrum of a company, including how resources are allocated, how investments are made, and how processes can be optimized to reduce environmental impact while maintaining profitability. For instance, investing in a high-bay warehouse in China could reduce long-term storage costs and improve operational efficiency, but it also represents a significant capital investment that needs to be factored into the overall sustainability strategy. As a result, any comprehensive evaluation of sustainable development within a company is neither straightforward nor definitive. Instead, it is a dynamic process that requires constant assessment and adjustment. Companies must weigh multiple, often competing factors—such as cost efficiency, environmental impact, and operational functionality—and find a balance that aligns with their sustainability goals. While the challenges are complex, these aspects of sustainability can be managed and controlled with the right tools, metrics, and strategic decision-making, allowing businesses to pursue sustainability in a more measured and adaptable manner.

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