TSUE

YASHIL

IQTISODIYOT&TARAQQIYOT

Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal

№7

ISSN: 2992-8982

https://yashil-iqtisodiyot-taraqqiyot.uz/

2025

YASHIL
IQTISODIYOT&TARAQQIYOT
Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal

Elektron nashr. 169 sahifa.
E’lon qilishga 2025-yil 1-iyulda ruxsat etildi.

IQTISODIYOT&TARAQQIYOT

Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal

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Muassis: “Ma’rifat-print-media” MChJ
Hamkorlarimiz: Toshkent davlat iqtisodiyot universiteti, O‘zR Tabiat resurslari vazirligi, O‘zR Bosh prokuraturasi huzuridagi IJQK departamenti.

Jurnalning ilmiyligi:
““Yashil” iqtisodiyot va taraqqiyot” jurnali
O‘zbekiston Respublikasi Oliy ta’lim, fan va innovatsiyalar vazirligi huzuridagi Oliy attestatsiya komissiyasi rayosatining 2023-yil 1-apreldagi 336/3-sonli qarori bilan ro‘yxatdan o‘tkazilgan.

MUNDARIJA

MUNDARIJA СОДЕРЖАНИЕ CONTENTS

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«SUSTAINABLE LOGISTICS PRACTICES. MINIMIZING CARBON EMISSIONS IN GLOBAL SUPPLY CHAINS»

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Abstract: An escalating alarm about the growth of climate change has illustrated the importance of green logistics practices, especially in the global supply chain, where transportation and distribution sectors release more emissions. Supply chains play a key role in the global economy, and at the same time, they are considered as primary contributors to emissions accumulation. As there is huge pressure on businesses, especially within small and medium-sized enterprises, that force them to align with sustainable practices, these small companies do not have opportunities to implement sustainable practices due to the lack of resources, knowledge, and support in this field. Despite these companies' importance, their impact and capability still unexplored. Subsequently, the main aim of this study is to explore how small and medium-sized businesses (SMEs) could facilitate the reduction of carbon emissions and maintain the effective position of their work.

Key words: climate change, transport, SMEs, global supply, sustainability, logistics.

Annotatsiya: Iqlim o'zgarishining o'sishi haqidagi xavotirning kuchayishi, ayniqsa, transport va tarqatish sektorlari ko'proq emissiyalarni chiqaradigan global ta'minot zanjirida yashil logistika amaliyotlarining muhimligini ko'rsatdi. Ta'minot zanjirlari global iqtisodiyotda asosiy rol o'ynaydi va shu bilan birga ular emissiya to'planishiga asosiy hissa qo'shuvchilar sifatida qaraladi. Tadbirkorlik subyektlariga, ayniqsa, kichik va o'rta korxonalarda ularni barqaror amaliyotga moslashishga majbur qiladigan katta bosim mavjud bo'lganligi sababli, ushbu kichik kompaniyalar ushbu sohada resurslar, bilim va qo'llab-quvvatlash yetishmasligi tufayli barqaror amaliyotlarni amalga oshirish imkoniyatiga ega emaslar. Ushbu kompaniyalarning ahamiyatiga qaramay, ularning ta'siri va qobiliyati hali ham o'rganilmagan. Keyinchalik, ushbu tadqiqotning asosiy maqsadi kichik va o'rta biznes (KO'K) uglerod chiqindilarini kamaytirishga qanday yordam berishini va o'z ishining samarali pozitsiyasini saqlab qolishini o'rganishdir.

Kalit so'zlar: iqlim o'zgarishi, transport, KO'K, global ta'minot, barqarorlik, logistika.

Аннотация: Растущая тревога по поводу роста изменения климата продемонстрировала важность экологически чистых логистических практик, особенно в глобальной цепочке поставок, где секторы транспортировки и распределения выбрасывают больше выбросов. Цепочки поставок играют ключевую роль в мировой экономике, и в то же время они считаются основными источниками накопления выбросов. Поскольку на бизнес, особенно на малые и средние предприятия, оказывается огромное давление, которое заставляет их соответствовать устойчивым практикам, эти малые компании не имеют возможности внедрять устойчивые практики из-за отсутствия ресурсов, знаний и поддержки в этой области. Несмотря на важность этих компаний, их влияние и возможности все еще не изучены. Следовательно, главная цель этого исследования — изучить, как малые и средние предприятия (МСП) могут способствовать сокращению выбросов углерода и поддерживать эффективное положение своей работы.

Ключевые слова: изменение климата, транспорт, МСП, мировые поставки, устойчивое развитие, логистика.

INTRODUCTION

In later decades, sustainability issues have picked up worldwide significance, particularly in the field of logistics and supply chains. As we know, logistics and supply chain play a significant role in our daily lives by

providing the smooth movement of goods and services. They help us to access essential products such as food, medicine, and clothing from different parts of the world with speed and reliability. Moreover, logistics and supply chains are considered as the backbone of modern life, connected businesses and individuals worldwide. Logistics involves all stages of the supply chain, including procurement, transport, warehousing, distribution and reverse logistics. However, traditional logistics forms are accompanied by high carbon emissions, which have a negative effect on the environment. Specifically, over-reliance on fossil fuels including coal, oil, gases from transportation and manufacturing usually aid to increase greenhouse emissions. Subsequently, these emissions caused the rise of global temperature, loss of habitats and extreme weather conditions. Despite their importance, they are seen as the largest sources of greenhouse gas emissions. According to the International Energy Agency (IEA), the transportation field made up about 24% of global CO2 emissions and a significant portion of these has been generated by logistics process. These escalating numbers depict the importance of implementing sustainable practices as soon as possible to reduce environmental damage and improve quality of supply chain process by protecting the ecosystem. Therefore, the main aim of this thesis is to explore and stimulate sustainable logistics, and reduce carbon footprint across the world with the central focus on the role of small and medium-sized enterprises (SMEs). SMEs are considered as primary components of innovation and growth, but still their position in sustainable development is unexplored. On top of that, their flexibility and adaptability offer chance to experiment with and implement sustainable practices. With an increase of climate change and negative impact of logistics operations, this work aims to understand the importance of SMEs, which play a significant role in global supply chains, and how they can implement environmentally responsible actions despite facing some challenges. Specifically, the primary objectives of this paper lie in identifying effective sustainable logistics practices and main sources of carbon emissions, analyzing the role of SMEs, exploring specific barriers and challenges during the transition to sustainable logistics and recommend strategies and policy to SMEs to overcome the challenges and achieve environmental sustainability. The research also seeks to address the current gap in existing literature by focusing on contribution of small and medium sized enterprises and suggesting tailored strategies coupled with their capabilities and limitations. Inclusive sustainability shows the importance of involving businesses of all sizes, including SMEs, in global effort to minimize environmental impact, as well. Subsequently, this dissertation is based on balanced framework of sustainability including three key aspects such as environmental responsibility, operational efficiency and economic viability. This balanced approach offers SMEs to maintain sustainability without sacrificing finance, allowing businesses with limited resources achieve sustainable practices. This framework facilitates businesses to easily adopt eco-friendly practices while keeping efficient processes and financial stability. By maintaining balance among these aspects, organizations like small and medium-sized enterprises (SMEs), can significantly contribute to sustainability globally without compromising their growth and competitiveness. The main concept of this thesis is based on understanding how sustainable logistics is essential for reducing emissions and being carbon-neutral. This work will also assess how small and medium sized companies can contribute to developing strong and adapted supply chain, which can resist global environmental challenges.

REVIEW OF LITERATURE ON THIS SUBJECT

It is clear that sustainable logistics is considered as crucial area of research and attract more and more researchers across the world to figure out its challenges and minimize its effects. There are the numbers of sectors that facilitate to rise of carbon emissions; however, logistics is seen as one of the main contributors among them. Even though logistics makes our life easier and faster, its repercussions harm our environment and planet. One of them is climate change that raises an alarm of business holders and policymakers who is trying to reduce carbon footprint through advance technologies, implementation of green strategies and special laws. This literature review explores hypotheses, challenges, and sustainable strategies that have been done by other researchers. Moreover, it also examines global initiatives; policy frameworks coupled with technological advancements tend towards reducing greenhouse gases in logistics, through various methodologies that have been used to achieve sustainability by scholars

Green Supply Chain Management has a significant role in logistics, it helps to minimize environmental impact especially in logistics sphere, enhance logistics operations and develop collaborative sustainability. Many researchers are convinced that implementing green supply chain management (GSCM), sustainable warehousing, eco-friendly transportation, and digital approach are necessary steps to reduce emissions. According to Lee and Hussain (Lee,C.-C.,& Hussain, J., 2024), by improving the behaviour of participants in supply chains, manufacturers, agents, and retailers, the framework supports the development of being carbon neutral and maximizes profit. There is an escalating concern about climate change and firms coupled with companies are forced to adopt GSCM as a strategy to meet environmental conformity and boost brand

reputation, especially small and medium-sized companies despite the obstacles they face including financial and technological challenges (El Mokadem,M.Y.,& Khalaf,R.K., 2024). The collaboration plays a significant role in implementation of green supply initiatives, especially among stakeholders, including suppliers, manufacturers, policymakers (Gelmez,E.,Ozceylan.,&Mrugalska,B., 2024).

According to Kumar and his colleagues (2023), environmental impact can be reduced and new revenue streams can be created with the help of reverse logistics, while it is important to acknowledge that it was overused in developing countries. Moreover, the research done by Bălan and Derban (2023) strengthened findings about importance of reverse logistics, where he explored the way how businesses improve the network of reverse logistics to boost sustainability and cost efficiency. Furthermore, they were convinced that their main findings as properly designed reverse logistics networks can minimize waste, while it can boost profitability and foster circular economy initiatives. One of the widely used theoretical frameworks in sustainable logistics and green supply chain management is the Triple Bottom Line, which was introduced by John Elkington in 1998. He showed the way how companies should balance three key dimensions, such as social, planet, and economic, to achieve sustainability (JohnElkington, 2007) .(Govindan and Hasanagic (2018)researched the implementation of sustainable practices associated with the circular economy in the supply chain. Their work gives a clear understanding that businesses can adapt to a circular model from a linear logistics, while tackling sustainable issues. On top of that, the study highlights the advantages and disadvantages of CE implementation. The main finding of this review is identifying factors that influence on adaptation of the circular economy, including ecological awareness, economic benefits, technological innovations, and changing consumers' demands. However, there are several barriers, such as financial support, lack of expertise, sophisticated supply chain networks, and policy instability, hinder the large-scale implementation of green logistics strategies. To overcome these challenges, some suggestions were recommended by authors, such as investing in sustainable packaging, fostering collaboration with other companies, and using digital technologies like IoT and blockchain to promote sustainability. . Recent studies have introduced organized strategies aiming to reduce carbon emissions across supply chains. Rajeev et al. (2020) suggest a comprehensive multi-layered strategy that involves optimizing supply chain sustainability through the usage of supply chain transparency, integrating low-emission transport options, and implementing reverse logistics activities. For Ghosh (2021), methods like carbon footprint tracking and sustainable measurement are important in identifying emission hotspots, still these techniques are not commonly adopted by small and medium-sized companies. However, Gómez-Garza et al. (2024) highlight that while life-cycle assessment (LCA) is useful tool to measure environmental impact, many SMEs could not afford its adoption due to high costs, technical difficulties, and lack of expertise. Moreover, Dhillon et.al (2023) argue that many green and flexible supply chains models have been introduced to meet the needs of large companies especially in developed countries, often overlooking the infrastructure gaps and regulatory obstacles faced in emerging economies. As a result, there is a strong demand for decarbonization approaches that are adaptable to operational capacities and specific needs of SMEs in developing countries. Collaboration especially among SMEs, suppliers and other stakeholders is important for sustainable logistics. Uwamahoro et al. (2024)explore the study in Rwanda that supply chain collaboration coupled with strategic partnership, built on information exchange and mutual trust, significantly boost SMEs outcomes and efficiency. Madina-Serrano et al. (2020) highlight that the combination of sustainability goals with collaborative supply chain decision-making can promote supply chain designs that are both environmentally friendly and agile. On top of that, Xiong (2024) emphasizes that B2B digital platforms, such as Alibaba's 1688 in China, give opportunity SMEs to collaborate for sustainable, optimize logistics coordination, and exchange with environmentally friendly innovations. These studies show that collaborative approaches, including data sharing, joint warehousing, and consolidated logistics facilitate the reduction carbon emissions among SMEs. Moreover, it helps to boost efficiency and enhance access to main resources. However, successful collaboration depends on mutual trust, transparent governance, and supportive institutional frameworks to keep partnerships, particularly in context of developing country. Digital technologies, including big data analytics, the Internet of Things (IoT), and cloud computing can significantly help to reduce carbon emissions in logistics operations. These advanced technologies make logistics operations more efficient through increased transparency, reduced utilization of fuel, and optimized delivery routes, according to Wamba et al. (2020). While Kamble and his co-workers (2019) suggest that using of Internet of Things in logistics can minimize carbon dioxide and make transportation more efficient. However, there is no equal access to these benefits, especially for small companies in developing countries. As highlighted by Tan and colleagues, small and medium-sized enterprises do not have enough access for digitalization especially in terms of funding, established workers to adopt these technologies in developing countries. As a result, even though these digital tools can increase environmental outcomes, their effectiveness remains still limited unless SMEs receive greater support (Tan,H.,Zhan,Y.,Ji,G.,Ye,F.,&Chan,C.K., 2021).

RESEARCH METHODOLOGY

In this study adaptations of pragmatism philosophy can be seen, which allows for the use of both objective and subjective views to tackle real world issues. Pragmatism is an important tool to understand the interdisciplinary nature of sustainability and logistics because this is a field, which is appropriate option focusing on utilitarian and hands on solutions rather than theoretical ones. Without a pragmatist research philosophy, well-rounded conclusions would not be able to be produced using diverse sources of data in terms of SMEs environmental challenges. A mix method of approach was selected for this study to identify the strength of both qualitative and quantitative methodologies. The quantitative component involves the use of online survey targeting SMEs professionals engaged in logistics and supply chain operations. This method is conducted to collect measurable data related to logistics practices carbon emission management strategies and faced challenges. The qualitative element includes observations with selected participants who are responsible for decision making within SMEs, this observation make it possible to delve into deeper insights of how sustainability principles are carried out as well as green practices adaptation are experienced by drivers (Figure 1).

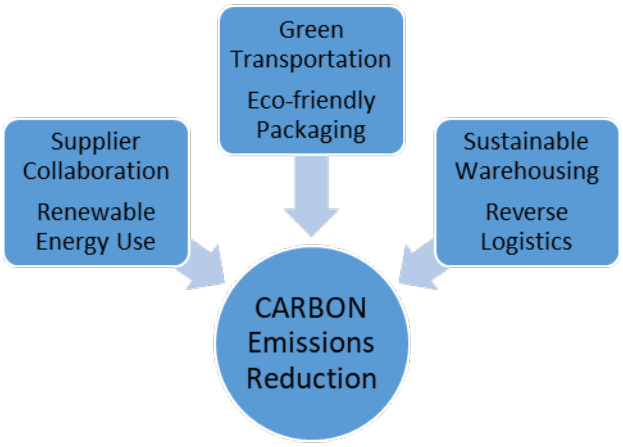

Figure 1 Key sustainable logistics approaches for minimizing Emissions

Source: Own elaboration

The research design of this work is useful for understanding the current situation and the potential for the future improvements, adopting a descriptive and exploratory research design because it enables the researcher to collect specific true proves at the same time studying new topics and future concerns in reducing carbon emissions faced by SMEs. A part from the descriptive element, the exploratory one covers the factors influencing these practices and the problems SMEs face during their implementation. A theoretical framework illustrates the relationships between sustainable practices in Figure 2 that have been adopted by SMEs and their influence on minimizing carbon emissions in global supply chains. Two types of data collection methods were used primary, including survey and observations, and secondary, with articles from academic books and journals. The usage of Google Forms helped a lot in designing an online questionnaire. Both close-ended and Likert-scale questions about green logistics practice, carbon footprint reduction initiatives and faced obstacles were included in the survey to ensure consistency and to make statistical analyses easy. Selected members of SMEs organizations were observed according to this data. It provided a chance to broaden their horizons in terms of these members' experiences, the problem that they encountered during logistics practices, and focusing in details. The questionnaire was sent via-email to SMEs forms and logistics associations. Secondary data was collected from peer reviewed journals, academic books, local reports on sustainability, guidelines on carbon emissions, and online resources. This data served as framework for the research problem, analyzing the literature review and finding difference between primary and existing studies.

The target population of this work comprises Small and Medium-sized Enterprises (SMEs) that plays a key role in global supply chain activities. These companies, located in Uzbekistan, work with sectors such as manufacturing, distribution, and retail. Moreover, these small and medium sized businesses have been selected due to their operations in global logistics, transportation, procurement, and distribution activities, where green logistics practices are very important. Uzbekistan was chosen due to its status as a developing economy undergoing structural logistics reforms and sustainability transitions. In Uzbekistan, SMEs face various challenges, including limited infrastructure, policy gaps, and low implementation of green technologies, which make it crucial area for exploring the feasibility of sustainable logistics. Understanding the role of SMEs in terms of logistics practices and efforts to minimize carbon footprint gives specific insights to challenges

and opportunities they have. In this research dual-method sampling strategy was used, including purposive and convenience sampling. The first one was utilized to find right members of observations, depending on their position and proficiency in logistics sphere. With the help of business contacts, recommendations, and professional network, subjects of observations were found that facilitate providing depth of relevant insights from ones who directly engaged in logistics process. For quantitative online survey the usage of convenience sampling facilitates to target SMEs professionals through SMEs associations and online groups. When it comes to sample size, more than 40 survey responses have been targeted to gain valid representation of logistics practices within SMEs. Approximately 6 observations in working process of SMEs managers or logistics professionals were conducted to collect valuable qualitative insights. Two data analyses techniques such as quantitative and qualitative were used in this research. Descriptive statistical assist systematically analyzing the quantitative data which have been gathered via online survey such as Google Form. These descriptive analyses involved summarizing key aspects of the data by measuring frequencies, percentages, and distributions of responses. These key features were used to display and explain questions related to companies' size, logistics activities, and carbon footprint reduction initiatives. Furthermore, in order to clearly understand all nuts and bolts, cross-tabulation techniques were used to identify correlation between these variables within SMEs practices. After getting results, comparisons were carried out from current literature to measure the level of adjustment and divergence. The qualitative data collected from observations was analyzed using thematic analysis. It is considered as an approach offering a flexible method for identifying, analyzing, and reporting trends with qualitative data. The process involved six steps: filled notes of certain observation, data familiarization by reviewing all notes multiple times, initial coding to display key observations, concepts, and problems regarding to sustainable logistics, collating codes and reviewing themes to make sure that all research objectives are coherent, relevant, and align with each other, and grouping and naming things giving appropriate and descriptive name to each final stage. The stages that occurred from the observational data are resource regulations, costumer expectations, and technological adoption.

ANALYSIS AND RESULTS

This chapter will explore and discuss the key findings of survey and data that were collected during research from observations. The research aimed to examine the way in which Small and Medium Enterprises (SMEs) contribute to reduction of emissions through green practices in global supply chains. With the help of survey and direct observations, the current practices, obstacles, and plans of small businesses were clearly identified and comprehended. This chapter offers a presentation of main findings collected through quantitative and qualitative methods, in relation to the research objectives and relevant literature. Moreover, this discussion highlights the strengths and weaknesses of current sustainable initiatives among SMEs in SMEs logistics, through the integration of practical findings with theoretical insights. Finally, the discussion concludes with a summary of key insights that connects the main points of this research and informs the concluding chapter.

The survey of this research was held among 41 people in Uzbekistan, coming from different industries, including manufacturing, logistics and retail. Most of them are familiar with operation management and supply chain, ensuring knowledgeable and valid sample for this thesis. The survey made up 14 questions divided into 3 main sections: demographic information, current sustainable practices, and challenges and opportunities (Figure 2).

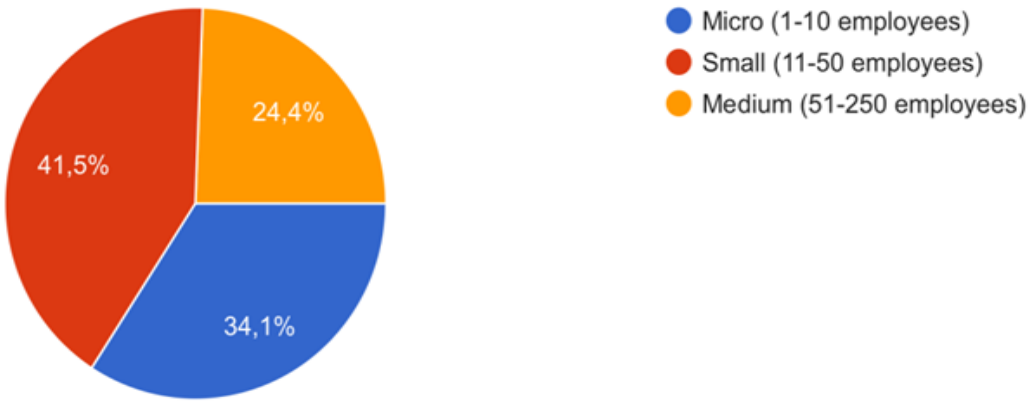

Figure 2. The distribution of SMEs based on the number of employees

According to chart, 15 surveyed companies adopted energy sufficient vehicles, while other 13 companies are focused on reduction packaging waste. 12 Companies use digital tools and advance technologies to be sustainable. Other 9 companies implement recycling method, while optimization of delivery routes are done only by 6 companies. Four companies have collaboration with eco-friendly corporations, and seven of them do not implement any of them (Figure 3).

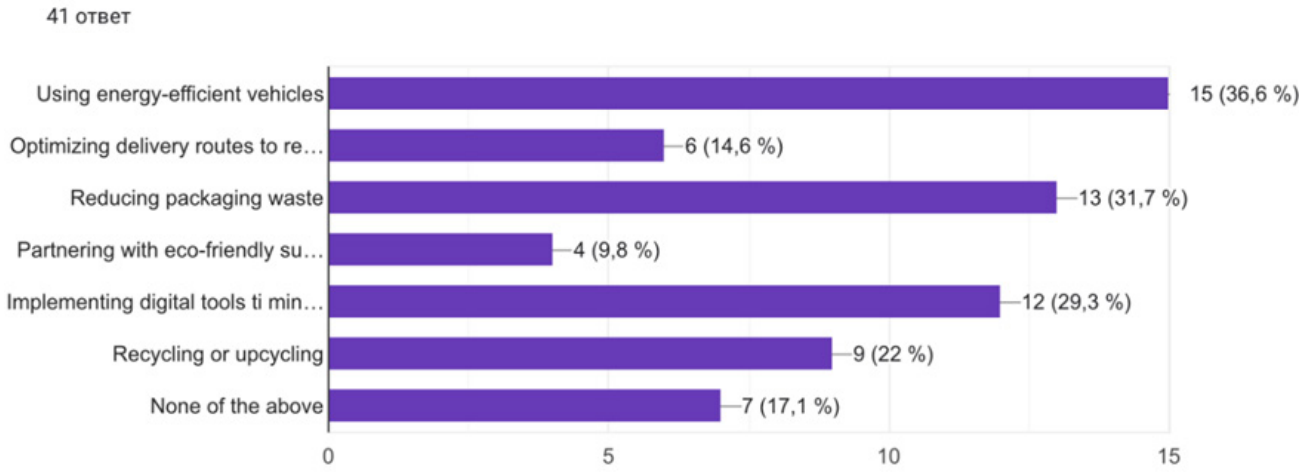

Figure 3 Types of sustainable logistics practices adopted by SMEs

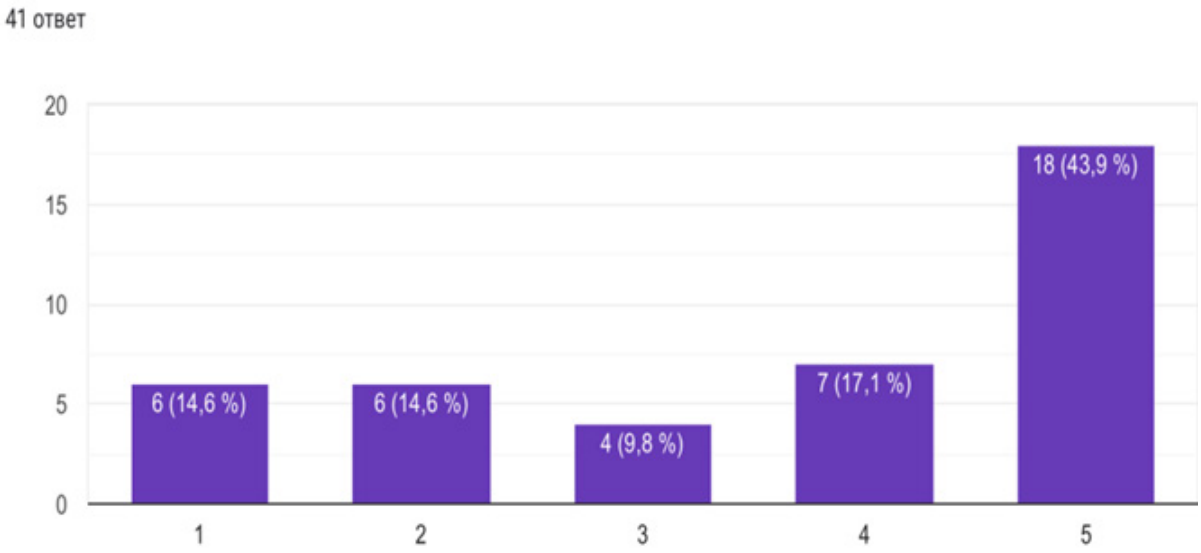

Figure 4 The importance of reduction carbon footprint in logistics operations (scale of 1 to5).

This given chart depicts the importance of minimizing emissions in companies during logistics operations. It is clear from the chart that most of respondents replied with 5 indicating that it is really important, accounting for 43.9% of sample. 17.1% of respondents answered with 4that it is quite important. Other 9.8 % responded with 3, they hold neutral position in terms of minimizing emissions. 14.6% of SMEs consider reduction of carbon footprint as not important, and another 14.6% as slightly important. This means approximately 29% of respondents give little importance on minimizing emissions. These findings show that, while awareness about sustainability is growing, a significant number of companies still do not view it as crucial factor in logistics (Figure 5).

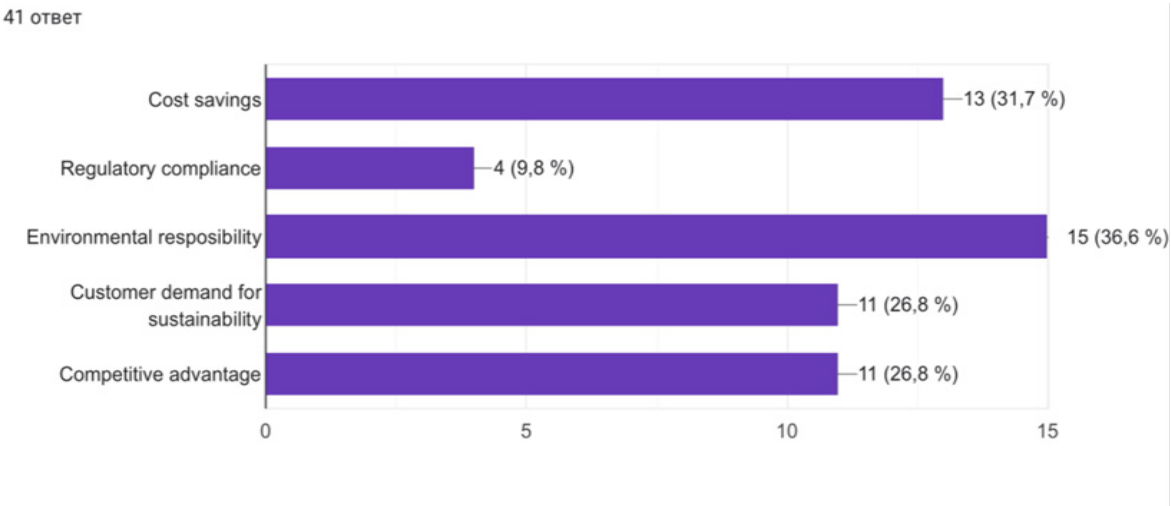

Figure 5 Key factors driving the adoption of sustainable logistics practices among SMEs.

With regard to the chart, one of the driving factors for implementing green practices is environmental responsibility among the respondents, indicating 36.6%, followed by cost savings that made 31.7 % of sample. However, 26.8 %of companies went for customer demand section, while other 26.8% find competitive advantage as motivational factor. Only for 9.8 % of respondents, regulatory compliance is less influential.

The findings of this study, based on surveys, field observations, and existing literature, shows a clear gap between sustainability awareness and practical engagement of SMEs in logistics operations, in Uzbekistan. While survey results illustrate a general awareness of the importance of reducing carbon emissions, very few companies actually use green practices, such as electric vehicles, developed route planning, or collaborate with eco-friendly partners. Observation insights highlight that most companies do not have a special department for sustainability or use of digital systems for managing logistics. In several cases, managers expressed interest in sustainable methods but due to lack of tools, expertise, and clear leadership could not excel at sustainability. The real-world observations proved the theoretical challenges, mentioned in the literature, including problems with financial support, knowledge gaps and policy support. The presence of three data sources, such as quantitative, qualitative, and secondary, shows a strong desire among small and medium-sized companies to improve their ecological position and become eco-friendly if structural obstacles can be addressed. These results highlight the need for support through local sustainability plans, training programs, and targeted policy measures that align with how SMEs operate in developing countries.

CONCLUSION AND RECOMMENDATIONS

To conclude, this study was conducted to explore sustainable logistics strategies in supply chain management that facilitate reduction carbon emissions across the world, with specific focus on the importance of small and medium-sized businesses (SMEs). It is clear that logistics sector is considered as main contributor to greenhouse gas emissions and that is why it faces severe pressure from every existing sphere, especially it is forced to adopt as environmental concerns coupled with climate change to form international goals and polices. While large multinational corporations that usually have enough resources and infrastructures to adopt green supply strategies and solutions, small and medium-sized companies have to address unique challenges, including lack of expertise in this field, and lack of government and financial support. However, significance of these companies with their adaptability and inventiveness plays a huge role in supply chains, providing unwavering support for boosting green development, especially in globe. Through this research several key sustainable practices were identified, including route optimization, the usage of electric vehicles or that which release low level of gases, collaboration with eco-friendly partners that could be an example to follow, more investment in sustainable logistics, training stuff about green practices to raise awareness about pressing environmental issues such as greenhouse gases and climate change.

There is a list of recommendations are presented to make implementation of sustainable practices faster and efficient, and subsequently to reduce carbon emissions in supply chains, based on findings of this research.

First and foremost, governments and credit institutions should offer special financial support to overcome high costs in terms of sustainable logistics technologies. It can be low-interest green loan, specific tax incentives, or grants that can significantly reduce financial obstacles within SMEs and expand international participation in sustainable plans.

Second, available access to knowledge and special trainings is crucial to raise awareness among business holders and show how their action negatively impact to environment. The number of small and medium sized companies lacks the specialized employees to gain emission free position and reduce carbon emission effectively. The solution is rooted in educational institutions and public organizations that should offer comprehensive programs focused on reduction gases and training how to use advance technologies for route optimization and measurement of emissions. Plus, offering these resources through online platforms would facilitate reach geographically isolated companies. Collaboration between small businesses and large corporations is crucial, because this partnership could facilitate development new innovations and solutions through sharing knowledge and resources. For example, shared transportations and warehouses can significantly reduce the usage of electricity and optimize cost efficiency, while minimizing emissions.

Thirdly, one of the best ways to reduce carbon emissions in supply chains is investment in digital infrastructures and green logistics technologies that would help to track environmental impact and monitor logistics operations. The environmental certifications also play a noticeable role in providing guidelines for SMEs to follow global environmental objective, and also can enhance competitiveness and reputation in markets all over the world. And one of the main suggestions is to raise awareness about the benefits of sustainability in logistics, governments and special associations can show the long-term benefit of green practices, including cost savings, good brand reputation and conformance with laws. Finally, regular assessment of progress with the help of constant monitoring coupled with evaluation systems facilitate SMEs identify areas for improvement and present their capabilities to investors.

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IQTISODIYOT&TARAQQIYOT

Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal

Ingliz tili muharriri: Feruz Hakimov

Musahhih: Zokir ALIBEKOV

Sahifalovchi va dizayner: Oloviddin Sobir o‘g‘li

2025. № 7

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““Yashil” iqtisodiyot va taraqqiyot” jurnali 03.11.2022-yildan
O‘zbekiston Respublikasi Prezidenti Adminstratsiyasi huzuridagi
Axborot va ommaviy kommunikatsiyalar agentligi tomonidan
№566955 reyestr raqami tartibi bo‘yicha ro‘yxatdan o‘tkazilgan.
Litsenziya raqami: №046523. PNFL: 30407832680027

Manzilimiz: Toshkent shahar, Mirzo Ulug‘bek tumani
Kumushkon ko‘chasi, 26-uy.

Jurnal sayti: https://yashil-iqtisodiyot-taraqqiyot.uz