

Springer Proceedings in Business and Economics

Anna Rummyantseva  
Hod Anyigba  
Elena Sintsova  
Natalia V. Vasilenko *Editors*

# Finance, Economics, and Industry for Sustainable Development

Proceedings of the 4th International  
Scientific Conference on Sustainable  
Development (ESG 2023), St.  
Petersburg 2023

 Springer

**Springer Proceedings in Business  
and Economics**

Springer Proceedings in Business and Economics brings the most current research presented at conferences and workshops to a global readership. The series features volumes (in electronic and print formats) of selected contributions from conferences in all areas of economics, business, management, and finance. In addition to an overall evaluation by the publisher of the topical interest, scientific quality, and timeliness of each volume, each contribution is refereed to standards comparable to those of leading journals, resulting in authoritative contributions to the respective fields. Springer's production and distribution infrastructure ensures rapid publication and wide circulation of the latest developments in the most compelling and promising areas of research today.

The editorial development of volumes may be managed using Springer Nature's innovative EquinOCS, a proven online conference proceedings submission, management and review system. This system is designed to ensure an efficient timeline for your publication, making Springer Proceedings in Business and Economics the premier series to publish your workshop or conference volume.

This book series is indexed in SCOPUS.

Anna Rumyantseva • Hod Anyigba •  
Elena Sintsova • Natalia V. Vasilenko  
Editors

# Finance, Economics, and Industry for Sustainable Development

Proceedings of the 4th International Scientific  
Conference on Sustainable Development  
(ESG 2023), St. Petersburg 2023

 Springer

*Editors*

Anna Rumyantseva  
Saint Petersburg University of Management  
Technologies and Economics  
St. Petersburg, Russia

Hod Anyigba  
Nobel International Business School  
Accra, Ghana

Elena Sintsova  
Saint Petersburg University of Management  
Technologies and Economics  
St. Petersburg, Russia

Natalia V. Vasilenko  
Saint Petersburg University of Management  
Technologies and Economics  
St. Petersburg, Russia  
International Banking Institute  
Anatoliy Sobchak  
St. Petersburg, Russia

ISSN 2198-7246 ISSN 2198-7254 (electronic)  
Springer Proceedings in Business and Economics  
ISBN 978-3-031-56379-9 ISBN 978-3-031-56380-5 (eBook)  
<https://doi.org/10.1007/978-3-031-56380-5>

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2024

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG  
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

If disposing of this product, please recycle the paper.

# Contents

<b>Sustainable Development as a New Paradigm of Economic Security in a Multipolar World. . . . .</b>	<b>1</b>
Natalia V. Vasilenko and Vitaly A. Mordovets	
<b>Sustainable Agriculture for Muslim Farmers in Thailand: Blending Islamic Principles of Sustainable Living. . . . .</b>	<b>13</b>
Felicito Jabutay, Tan Limpachote, and Sasithorn Suwandee	
<b>Prospects for Russia: SPIEF 2023 Agenda. . . . .</b>	<b>33</b>
Elena A. Sereda, Maria P. Efremova, and Anna-Maria Arias	
<b>Youth Craft Entrepreneurship as a Form of Promoting Ethnic Specificity (on the Example of Kazan) . . . . .</b>	<b>43</b>
Albina R. Garifzianova	
<b>The Instruments of Sustainable Development Financing: Trend Analysis and Search for Opportunities. . . . .</b>	<b>53</b>
Anna Rumyantseva and Olga Tarutko	
<b>Volunteer Practices in the System of Socially Oriented Activities of Organizations . . . . .</b>	<b>71</b>
Maria Eflova and Anna Lipatova	
<b>Application of Digital Twin of an Enterprise in the Context of Implementation of the Sustainable Development Concept in Financial Management. . . . .</b>	<b>79</b>
Vladimir A. Kunin and Igor E. Ryskov	
<b>Approaches to Managing Organizational and Non-organizational Stresses in the Gig Economy and Precarization of Labor Relations . . . . .</b>	<b>93</b>
Elena V. Kulchitskaya, Darya G. Shvetsova, and Yana A. Kalugina	
<b>Big Data as a Tool for Assessing Consumer Practices and Efficiency of Consumer Problem Solving. . . . .</b>	<b>103</b>
Anna Lipatova	

<b>Reflection of the Youth Social Problems in Russian Social Advertising</b> .....	115
Tatiana Afanasyeva, Elena Torgunakova, and Evgeniy Torgunakov	
<b>Revisiting the ESG Agenda Requirements for the Corporate Strategy of Large Companies</b> .....	123
Heydar S. Hasanov, Yuliya I. Rastova, and Alla Yu. Gorbunova	
<b>Environmentally Oriented Cost Accounting and Accounting of Estimated Liabilities of Economic Entities</b> .....	131
Dmitry Karagodin and Maria Tsyguleva	
<b>International Legal and Economic Aspects of Transportation by Railways in the EAEU and the People’s Republic of China</b> .....	141
Yury Mishalchenko, Grigoriy Gumenyuk, and Maria Mishalchenko	
<b>Prospects for the Implementation of Sustainable Development Agenda in the Agricultural Sector of the Economy</b> .....	149
Galina Gritsenko, Svetlana Levina, and Svetlana Dovbysh	
<b>Modern Imperatives of Economic Security System Development: National Priorities and Challenges</b> .....	159
Natalia Meshkova, Olga Boyarskaya, Elena Golovchanskaya, and Julia Stepanova	
<b>The Use of Blockchain Technology for Transport and Logistics Systems in the Digital Economy</b> .....	171
Irina Vaslavskaya, Irina Koshkina, and Rimma Zaripova	
<b>Additional Education as a Resource for Sustainable Development of a University</b> .....	183
Natalia Ionova, Inga Filippova, Ksenia Derevianko, and Anastasia Kopyeva	
<b>Tax Transparency in Sustainability Reporting</b> .....	195
Svetlana Zhutiaeva, Mikhail Makarov, and Alexander Usanov	
<b>Rehearsal of a Local Flood and Climate Change</b> .....	205
Vitaly I. Akselevich, Gennady I. Mazurov, and Artur V. Sauts	
<b>Prospects for Comprehensive Forecasts When Assessing the Load of Railway Transport Infrastructure</b> .....	217
Ekaterina Malovetskaya, Elena Voskresenskaya, and Anna Mozalevskaya	
<b>On the Use of Digital Technologies in the Process of Tourist and Recreational Development of UNESCO World Heritage Sites in Danger</b> .....	227
Babek Asadov, Alexander Baranov, and Inga Filippova	

**Preserving Macro-environment Sustainability in the Russian Federation: Key Trends and Risks** ..... 239  
 Ludmila N. Babkina, Oksana V. Skotarenko, and Elena S. Kuznetsova

**Forecasting Profit from Sales Based on the Bit Analysis Methodology as an Element of the Process of Sustainable Economic Growth (ESG) Concept.** ..... 253  
 Gniyatulla Ishbayev, Anatoly Kuritsyn, and Natalia Lazareva

**Transformation of the Transport and Logistics Industry in the Context of Digital Economy Development.** ..... 265  
 Rimma Zaripova, Alexander Nikitin, and Alsu Rustamova

**ESG Parameters of Technopreneurship** ..... 275  
 Elena Ivleva, Elena Sintsova, and Nina Shashina

**Modeling and Forecasting Social Processes in the Labor Market** ..... 281  
 Olga S. Elkina and Stanislav E. Elkin

**Formation of a Technological Model as an Information System Form of the Ecosystem** ..... 301  
 Tatiana N. Kosheleva, Vitaly A. Mordovets, and Alexey V. Novoselov

**Promotion of ESG Principles in the Russian Banking Sector** ..... 313  
 Olga L. Bezgacheva, Anastasia V. Cheryapina, and Nadezhda M. Purina

**Professional and Personal Development of a Student as a Key to Sustainable Development of the State** ..... 323  
 Elena M. Zorina, Anzhelika Yu. Ivanova, and Elena I. Chirkova

**Management of a School Team’s Sustainable Development** ..... 337  
 Marina V. Lazareva, Lyudmila A. Deikova, and Elena V. Gubanova

**Mathematical Modeling of Transportation Flows** ..... 349  
 Elizaveta A. Petrova, Tamara K. Filimonova, and Galina A. Ovseenko

**Key Resources for Sustainable Development of Intersectoral Cooperation** ..... 359  
 Natalya Golubetskaya, Kirill Kazachenko, and Ekaterina Kovalenko

**Technological Integration of Environmentally Friendly Industries as a Factor of ESG Transformation.** ..... 367  
 Lyudmila M. Davidenko, Alexander E. Miller, and Ansagan N. Beisembina

**Innovation Clusters as a Factor of Sustainable Territorial Development in the Context of Digital Transformation** ..... 377  
 Dmitry Napolskikh



<b>CSR and ESG Transformation of Russian Brands: Cases of Food Industry Companies</b> .....	389
Veronika V. Lizovskaya and Artem A. Moldovan	
<b>Convergence of Sustainable Economic Development in Russian Regions</b> .....	401
Anastasia Kurilova, Dmitry Gura, and Svetlana Vasilyeva	
<b>Technologies of Eco-Branding of the Region’s Industrial Complex</b> .....	413
Lyudmila M. Davidenko, Maxim A. Miller, and Nurzhanat M. Sherimova	
<b>Implementation of Industrial Policy to Ensure Sustainable Development of the Economy of the Russian Federation</b> .....	425
Vitaly A. Mordovets, Yuri N. Vlasov, and Anna M. Khakhina	
<b>Issues of Transformation of Economic Relations and the Application of Contemporary Financial Instruments in the Energy Sector of the Russian Arctic Zone</b> .....	439
Olga N. Korableva, Vera D. Nikiforova, and Alexander A. Nikiforov	
<b>Specifics of Sustainable Development of Medical Tourism in South Korea</b> .....	451
Artur V. Kuchumov, Polina Yu. Eremicheva, and Ilia V. Bogrov	
<b>Competitive Activities as a Means of Improving Professional Training of Students in the Sphere of Technology and Interaction with Business</b> .....	465
Vera A. Fedotova, Guzel Il. Seletkova, and Natalia F. Bolshakova	
<b>Factors of Organizational Sustainability</b> .....	477
Elena V. Lylova	
<b>Selection of Financial Planning Methodology to Meet the Goals of ESG Strategies</b> .....	487
Elena Sintsova, Artem A. Moldovan, and Olga Voskresenskaya	
<b>Assessment of the Production Complex Sustainability of Leading Industrial Regions of the Russian Federation</b> .....	497
Anastasia V. Kupryakova, Miron A. Rastov, and Iury V. Gorbunov	
<b>Disclosure of Non-financial Information in Corporate Reporting as a Way to Company’s Sustainable Development under the Implementation of ESG Technologies</b> .....	507
Anna Rumyantseva, Natalia Lazareva, and Elena Goncharova	
<b>On the Problem of Social and Labor Adaptation of the Age Population in Modern Conditions</b> .....	519
Svetlana G. Nikolaeva and Luiza A. Yandarbaeva	

**State Financing of Siberia in the Context of Sustainable Development Goals** ..... 529  
 Dinar R. Baetova, Alla V. Zinich, and Oksana A. Gololobova

**Development of Green Economy and Balance of Economic Interests in Society** ..... 541  
 Sergey Yu. Solodovnikov, Tatsiana V. Serhiyevich, Elena V. Ushakova, and Oleg A. Smakotin

**New Regionalization and Evolution of the Concept of “Environmental Safety”** ..... 551  
 Sergey Yu. Solodovnikov, Tatsiana V. Serhiyevich, Aleksandr L. Pastukhov, and Vera A. Fedotova

**Risks of an Increase in International Technological Cooperation in the Context of Industry 4.0** ..... 561  
 Sergey Yu. Solodovnikov, Olga D. Ugolnikova, Aleksandr S. Dobkin, and Anastasia V. Ivahova

**Evolution of the Idea and Practice of Sustainable Development** ..... 573  
 Anna Rumyantseva, Sergey Yu. Solodovnikov, and Ksenia V. Skoraya

**The Problem of Legal Regulation of Intimate Services: The Use of Artificial Intelligence** ..... 583  
 Elena Voskresenskaya, Aleksey Dalinin, and Aleksey Volnov

**Strategic Competences Development as a Key Sustainability Factor: A Case Study of Bakery Production Company in Russia** ..... 591  
 Ksenia A. Kouzmina, Marina V. Vorobyova, and Dmitry V. Dmitriev

**Interaction Between the State and Business as a Management Process of Ensuring Sustainable Development** ..... 601  
 Tatyana N. Kosheleva, Vitaly A. Mordovets, Natalya Yu. Kuchieva, and Edgar O. Vardanyan

**Problems of Energy Efficiency Improvement in Mechanical Engineering** ..... 609  
 Anna Kalyashina, Yuri Smirnov, and Rimma Zaripova

**Public-Private Partnership as an Effective Tool for Managing the Sustainable Development System in Russia** ..... 619  
 Elena Vitsko, Elena Sintsova, and Valentina Kordovich

**Implementation of Digital Solutions in the Housing and Utilities Sector in the Context of Digital Transformation** ..... 629  
 Vera A. Fedotova and Olga A. Ganina

# Technological Integration of Environmentally Friendly Industries as a Factor of ESG Transformation



Lyudmila M. Davidenko, Alexander E. Miller, and Ansagan N. Beisembina

**Abstract** The active phase of scientific research in the field of technological transformations and their impact on the socioeconomic development of complex systems occur due to the factor assessment of the place and role of large companies in the regions where they are located. Effective policy of companies forms the institution of stakeholders, due to the implementation of joint programs in the education system and health care, as well as increases the motivation of the population to environmental literacy. At the same time, ESG transformation determines the specificity of technological integration of integrated economic structures through the interconnection of processes at the level of industrial companies implementing environmentally friendly technologies and striving for a gradual energy transition. The aim of the study is to demonstrate the relationship between the fundamental approaches of ESG transformation of industrial companies and mechanisms of technological integration of cleaner production. For this purpose, synthesis and analysis methods are used, which help to assess the socioeconomic factors that influence the emergence of the main trends of industrial economic transformation due to effective ESG policies. The stated objective implies a comprehensive analysis of the factors of production and sales of products to establish technological linkages in the promotion of environmental branding, as well as the development of recommendations to the participants of green technological integration. The proposed approaches to the technological integration of environmentally friendly industries help to achieve sustainable development rates of economic entities that are in a single value chain, as well as business environment stakeholders from cross-border regions of partner countries.

---

L. M. Davidenko (✉) · A. N. Beisembina  
Toraighyrov University, Pavlodar, Kazakhstan

A. E. Miller  
Omsk Scientific Center of Siberian Branch of Russian Academy of Sciences,  
Omsk, Russian Federation

## Introduction

The global trend toward energy transition and global ESG transformation has signaled to industrial companies the need to strengthen the links of the chain “green” technology—“green” product. This has increased the relevance of research, which has been directed toward the development of mechanisms for the integration of industrial companies that apply clean technologies. The trend toward cluster formations with elements of green economy should gradually contribute to the sustainable development of regions in the context of ESG principles. However, in the current period, ESG transformation of cross-border regions may meet certain barriers. These include shortcomings in the systemic approach of technological integration of environmentally friendly industries and subsequent certification in accordance with global standards. At the same time, there are still weak mechanisms for promoting knowledge about domestic ecological products, low interest of network trade in sales, and setting an adequate price for manufactured products. There is still no unified technology of ecological branding of domestic products and the practice of decision-making.

In this context, the role of scientific approaches in the design and implementation of ESG mechanisms that take into account the level of sustainability of enterprises in shaping their own growth strategy based on environmental, social, and governance indicators is increasing (Saxena et al., 2022). In particular, this is relevant for cases of technological integration in the areas of real-time data transfer and authentication and structuring of management processes and sub-processes. Researchers believe that enterprises shaping business processes for a green economy should be guided by the goal of carbon neutrality. This emphasizes environment, social responsibility, and governance (ESG) and green technology innovation (Zhang & Jin, 2022). The transformation of national green development as well as financial support from government agencies and private foundations can be considered an important element in the energy transition (Li & Pang, 2023). Green credit policies can significantly improve the ESG performance of enterprises that represent the core of industrial regions (Gao & Liu, 2023).

One can agree with the fact that ESG governance awareness needs to be strengthened through investor relations and active cooperation with governmental and non-governmental organizations (Park & Oh, 2022). In parallel, the role of the information and communication technology sector is increasing. IT companies are now contributing to the integration of cleaner industries, thereby potentially improving their ESG rating compared to the level already achieved (Egorova et al., 2022).

Thus, we have formed a hypothesis that technological integration of environmentally friendly industries is capable of being a factor of ESG transformation at the level of industrial enterprises that determine the sustainable development of the regions where their complexes are located.

## Materials and Methods

This study uses general scientific methods, including analysis, synthesis, induction, and deduction, analysis of industry statistical information, and comparative and system analysis of the study of domestic and foreign processes of technological integration of industrial complexes that introduce clean technologies and experience ESG transformation.

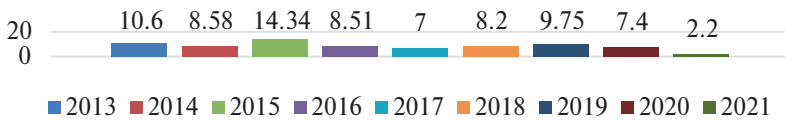
When analyzing for compliance with ESG principles among large companies that play a global role in the development of the economy of certain states, in particular Kazakhstan, it is advisable to use open information data on Sustainable Development Goals (SDGs). These reports show a number of problems: if the current growth rates are maintained in 2030, renewable energy sources will provide only a small part of the energy supply: about 660 million people will remain without electricity, and about two billion people will continue to use non-ecological fuels and cooking technologies (United Nations, 2023).

Making a connection from the general to the particular, we can state the fact that the awareness of global problems leads to the strengthening of environmental activities. As a proof of this, we can cite the fact that in Kazakhstan in 2021, the Ecological Code was adopted. This document contains a plan to regulate public relations in the field of environmental monitoring. By joint efforts of industrial companies and population, the level of hazardous waste generation is gradually falling (Fig. 1).

As a result of analysis and generalization of publicly available statistical information, it is possible to identify the signs of scientific and technological readiness of domestic industrial enterprises for “green” technological integration. The graphical method is used to visualize the obtained results; the quantification method and the parametric method are evaluation tools that help formalize the procedure for assessing the performance of technological integration of clean industries, combining approaches and participants acting as subjects and objects of integration processes.

## Results

Historically, the basis of Kazakhstan’s industrial economy is made up of coal, oil, gas, ferrous and nonferrous metal processing, petrochemicals, and power generation. They are organized by the type of cluster formations. As a rule, small- and



**Fig. 1** Dynamics of hazardous waste generation in Kazakhstan per capita, tons (Bureau of National Statistics Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, 2023a)

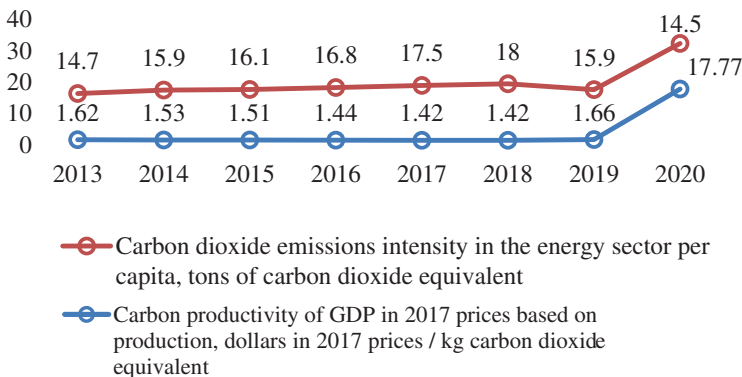
medium-sized businesses, as well as research and educational institutions of the country and cross-border regions, are territorially connected with large companies. When producing products, industrial enterprises must take into account environmental norms and standards, compliance with which is controlled by the Ministry of Ecology and Natural Resources of the Republic of Kazakhstan.

Analysis of changes in the carbon productivity of the gross domestic product (GDP), which characterizes the amount of GDP per unit of CO<sub>2</sub> emissions, has revealed a decrease in emissions from burning coal, oil, natural gas, and other fuels (Fig. 2).

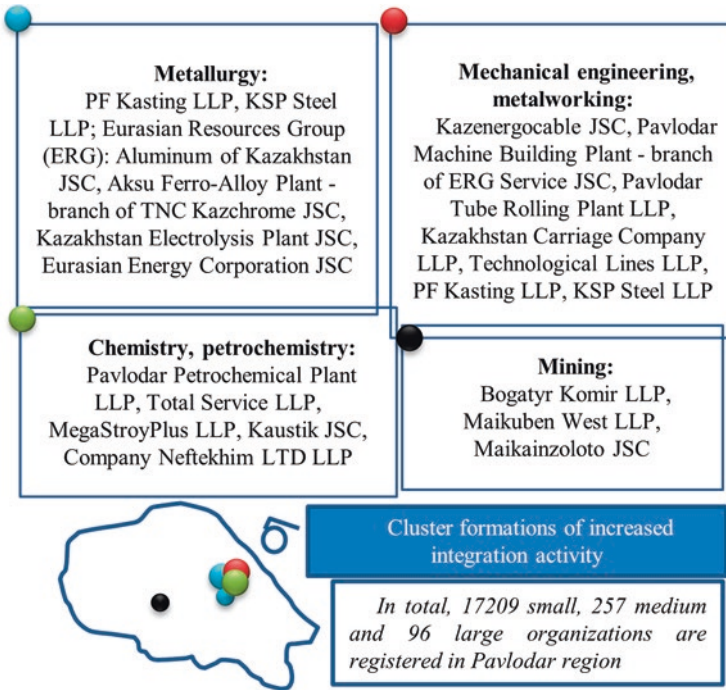
Based on the analysis of statistical information, it can be concluded that technological integration of environmentally friendly industries is in demand and promising for Kazakhstan and its partners. One of the centers of Kazakhstan industry is Pavlodar region. It belongs to the type of developed cross-border industrial regions with a complex transportation and logistics interchange. Large industrial companies operate in the region. They represent integrated economic complexes with which other entities interact. Large companies include the Eurasian Resources Group (ERG), which produces high-carbon ferrochrome and supplies iron ore and aluminum products to the Eurasian region (Fig. 3).

ERG contribution to Pavlodar region is 11% of the gross regional product. Analysis of the organization of production and technological processes of ERG industrial companies indicates that technological integration of environmentally friendly industries is possible only in conditions of coordination at the level of technological management with compliance with ESG principles (Figs. 4 and 5).

World practice shows that the following measures will contribute to the restoration and reproduction of natural resources: development of linked business models for production and sales of products; joint research and development of technological standards; stimulation of the inflow of “green” investments; replenishment of



**Fig. 2** Carbon productivity and dynamics of CO<sub>2</sub> emission intensity from energy use per capita in Kazakhstan (Bureau of National Statistics Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, 2023b)



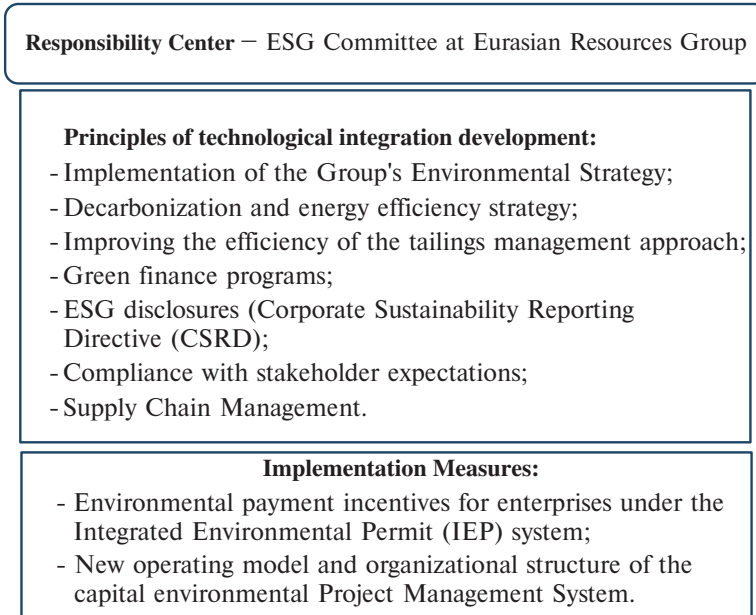
**Fig. 3** Sectoral diversification of economic entities of Pavlodar region, Kazakhstan



**Fig. 4** Model of ESG transformation of the technology management system in Eurasian Resources Group companies. Regulatory and legal block (Eurasian Resources Group, 2021)

the joint bank of the best available techniques, resource-saving technologies, and practices; and reduction of the volume and hazard level of waste generated.

Scientists are continuously conducting research, searching for mutually beneficial solutions in the field of systematization of approaches to the technological



**Fig. 5** Model of ESG transformation of the technology management system in Eurasian Resources Group companies. Block of technology integration (Eurasian Resources Group, 2021)

integration of environmentally friendly production in order to successfully pass certification in accordance with international standards in the future.

We have conducted a systematization of scientific works, which helped to summarize the approaches to technological integration on the “green” type. Enterprises can use this information to choose effective tools for integrated production management based on compliance with ESG principles (Table 1).

## Discussion

Practice shows that approaches to the technological integration of environmentally friendly production facilities may be unique, as well as opportunities to promote environmental branding of manufactured products. This is influenced by differences in the models of corporate governance and technological management, the degree of diversification at the industry and regional levels, and the possibility of attracting cheap sources for the transition to “green” technologies. Nevertheless, it is possible to come to common logical solutions to manage the processes of green economy. It should start with the use of saving technologies in the process of extraction and processing of raw materials and organization of the production process and end with eco-branding of industrial products. The desire of Kazakhstan companies to



**Table 1** Classification of approaches to green technology integration in the context of ESG transformation

Approaches to enhance technology integration	Subjects and objects of “green” integration	Commitment to ESG principles
Stimulating corporate environmental innovation	Companies—Initiators of “green” innovations and patents for “green” inventions	“Green” transformation of emerging markets and improving ESG rating systems (Khan & Liu, 2023; Wang et al., 2023)
Integration of industrial and investment capital	Companies—Participants of the stock market of “green” shares, ESG investors, financial analysts	Developing theories of ESG pricing and ESG investment promotion (Chen et al., 2023) A multi-criteria portfolio optimization model (Cesarone et al., 2022) Linking corporate responsibility and market signals in investment portfolio construction (Leins, 2020)
Sustainable development of enterprises based on digitalization	Digital business platforms to promote innovation through “green” processes and “green” products	Enterprise performance transformation using strategic alignment model (SAM) and ESG indicators (Zhao et al., 2023)
“Green” economy of the closed cycle	Related parties of the “green” blockchain, placing economic demands on individual transactions and supply distribution	Supply chains based on industrial Internet of Things and blockchain technology under the ESG concept (Qian et al., 2023; Subramoniam et al., 2022)
Establishing a correlation between ESG objectives and financial performance of companies	Industrial and technological sector companies, research and development centers	Stimulate research interest in economic sustainability and ESG (Cheng et al., 2023; Xia, 2022) Flexibility, transparency, and automation of data collection processes for ESG reporting (Cerchiaro et al., 2021)
Optimization of ESG benchmarking methods in real estate investments	Institutional investors, real estate fund managers, consultants, real estate investment trust (REIT) participants	ESG benchmarking (asset/fund levels, listed real estate, supply, reporting, and internal benchmarking) (Newell et al., 2023)
Tax incentives	Industrial companies, government agencies	Regulatory function of taxes and levies on emissions and pollution, raising environmental awareness, promoting green technological innovation to achieve sustainable development (Li & Li, 2022)

produce products in demand in the global economy is accompanied by the development and implementation of innovative management approaches, including compliance with ESG principles (Kaiyrgaliyeva et al., 2023; Sherimova et al., 2022). Russian scientists share our opinion that technological integration is inextricably linked to a set of social and environmental parameters that are important to rank by risk level, which helps to manage them effectively (Keresten et al., 2023). An

important component of a cleaner production organization is transportation corridors that ensure just-in-time supply chain continuity (Miller & Davidenko, 2022). Over the past 30 years, the Chinese industry has undergone an accelerated rise, which can be sustained through intellectual property protection and an increase in the number of patents for “green” inventions (Xu et al., 2021).

An important addition to the study of the problems of organizing environmentally friendly production is the activities of “smart” infrastructure construction. “Smart” cities are a factor of social transformation for centers of industrial concentration (Barykin et al., 2023). A unifying strategy is to link all sectors of the economy to the energy sector. In turn, companies in the energy sector are becoming leaders in the transition to new clean technologies to achieve the goals of sustainable development of connected systems (Nitlarp & Kiattisin, 2022).

## Conclusion

In the course of the conducted research, it is possible to confirm the hypothesis that technological integration of environmentally friendly industries can be a factor of ESG transformation at the level of industrial enterprises. First of all, this conclusion applies to city-forming enterprises and high expectations of the residents, and the states are placed on them. The integration system includes banks, institutional investors, and fund managers. Together, they participate in the realization of the growth strategy under different external circumstances, for example, volatility or economic activity of the sectoral market through portfolio diversification and environmental/climatic conditions. In the near future, a trend toward the formation of a new asset class—“climate” infrastructure—should become apparent. According to scientists, such projects can form a system of ecological pricing taking into account carbon emissions into the atmosphere. The new trend toward a “green” economy has manifested itself in the development of a system of financial instruments to address the problems of “climate” sustainable economic growth. This contributes to the conservation of natural landscapes and capacity building of “ecosystem” services, including eco-branding of industrial products that meet high environmental standards. In the future, experts and scientists will have to solve the problems of insufficient subsidies for green technologies, as well as to nurture a common environmental culture among the stakeholders of industrial companies.

As an effective measure, it can be suggested that experts work together to create an innovative ecosystem of “green” technologies. For this purpose, it is important to use state support, increasing environmental culture and awareness of people, which is the main resource for the development and implementation of all progressive technologies.

**Acknowledgments** This research is funded by the Committee of Science of the Ministry of Science and Higher Education of the Republic of Kazakhstan (Grant No. AP19676924)

“Development of technology and promotion of ecological branding of the industrial complex of the region”).

## References

- Barykin, S. E., Strimovskaya, A. V., Sergeev, S. M., Borisoglebskaya, L. N., Dedyukhina, N., Sklyarov, I., Sklyarova, J., & Saychenko, L. (2023). Smart City logistics on the basis of digital tools for ESG goals achievement. *Sustainability*, 15(6), 5507. <https://doi.org/10.3390/su15065507>
- Bureau of National Statistics Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. (2023a). Goal 12. Ensure sustainable consumption and production patterns. <https://stat.gov.kz/en/sustainable-development-goals/goal/12/>
- Bureau of National Statistics Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. (2023b). Green economy indicators. <https://stat.gov.kz/en/green-economy-indicators/25825/>
- Cerchiaro, D., Leo, S., Landriault, E., & De Vega, P. (2021). DLT to boost efficiency for financial intermediaries. An application in ESG reporting activities. *Technology Analysis & Strategic Management*, 1–14. <https://doi.org/10.1080/09537325.2021.1999921>
- Cesarone, F., Martino, M. L., & Carleo, A. (2022). Does ESG impact really enhance portfolio profitability? *Sustainability*, 14(4), 2050. <https://doi.org/10.3390/su14042050>
- Chen, S., Han, X., Zhang, Z., & Zhao, X. (2023). ESG investment in China: Doing well by doing good. *Pacific-Basin Finance Journal*, 77, 101907. <https://doi.org/10.1016/j.pacfin.2022.101907>
- Cheng, L. T., Lee, S. K., Li, S. K., & Tsang, C. K. (2023). Understanding resource deployment efficiency for ESG and financial performance: A DEA approach. *Research in International Business and Finance*, 65, 101941. <https://doi.org/10.1016/j.ribaf.2023.101941>
- Egorova, A. A., Grishunin, S. V., & Karminsky, A. M. (2022). The impact of ESG factors on the performance of information technology companies. *Procedia Computer Science*, 199, 339–345. <https://doi.org/10.1016/j.procs.2022.01.041>
- Eurasian Resources Group. (2021). Sustainable development reports. <https://www.erg.kz/en/content/ustoychivoe-razvitie/otchet-po-ustoychivomu-razvitiyu>
- Gao, W., & Liu, Z. (2023). Green credit and corporate ESG performance: Evidence from China. *Finance Research Letters*, 55, 103940. <https://doi.org/10.1016/j.frl.2023.103940>
- Kaiyrgaliyeva, M. G., Appakova, G. N., Nesipbekov, E. N., Baikadamov, N. T., & Karimbergenova, M. K. (2023). Trends in the development of the economic system in the Republic of Kazakhstan. *Business Strategy & Development*, 6(1), 95–100. <https://doi.org/10.1002/bsd2.225>
- Kersten, I., Tereshchenko, V., Miller, M., & Davydov, A. (2023). Development of the technology for diagnostic assessment of scientific, technical and financial risks of technology integration with production systems. In *E3S web of conferences* (Vol. 419, p. 02017). EDP Sciences. <https://doi.org/10.1051/e3sconf/202341902017>
- Khan, U., & Liu, W. (2023). The link between green innovations, corporate performance, ESG activities, and sharing economy. *Environmental Science and Pollution Research*, 30(32), 1–13. <https://doi.org/10.1007/s11356-023-27722-7>
- Leins, S. (2020). ‘Responsible investment’: ESG and the post-crisis ethical order. *Economy and Society*, 49(1), 71–91. <https://doi.org/10.1080/03085147.2020.1702414>
- Li, J., & Li, S. (2022). Environmental protection tax, corporate ESG performance, and green technological innovation. *Frontiers in Environmental Science*, 10, 982132. <https://doi.org/10.3389/fenvs.2022.982132>
- Li, W., & Pang, W. (2023). The impact of digital inclusive finance on corporate ESG performance: Based on the perspective of corporate green technology innovation. *Environmental Science and Pollution Research*, 30(24), 65314–65327. <https://doi.org/10.1007/s11356-023-27057-3>

- Miller, M., & Davidenko, L. (2022). Economic and information support of technological integration with the use of “green” traffic flows. *Transportation Research Procedia*, *61*, 715–718. <https://doi.org/10.1016/j.trpro.2022.01.112>
- Newell, G., Nanda, A., & Moss, A. (2023). Improving the benchmarking of ESG in real estate investment. *Journal of Property Investment & Finance*, *41*(4), 380–405. <https://doi.org/10.1108/JPIF-10-2021-0084>
- Nitlar, T., & Kiattisin, S. (2022). The impact factors of Industry 4.0 on ESG in the energy sector. *Sustainability*, *14*(15), 9198. <https://doi.org/10.3390/su14159198>
- Park, S. R., & Oh, K. S. (2022). Integration of ESG information into individual investors’ corporate investment decisions: Utilizing the UTAUT framework. *Frontiers in Psychology*, *13*, 899480. <https://doi.org/10.3389/fpsyg.2022.899480>
- Qian, C., Gao, Y., & Chen, L. (2023). Green supply chain circular economy evaluation system based on industrial internet of things and blockchain technology under ESG concept. *Processes*, *11*(7), 1999. <https://doi.org/10.3390/pr11071999>
- Saxena, A., Singh, R., Gehlot, A., Akram, S. V., Twala, B., Singh, A., Montero, E. C., & Priyadarshi, N. (2022). Technologies empowered environmental, social, and governance (ESG): An Industry 4.0 landscape. *Sustainability*, *15*(1), 309. <https://doi.org/10.3390/su15010309>
- Sherimova, N., Isabekov, B., Alkeev, M., Yermekova, Z., & Ostryanina, T. (2022). An analytical assessment of industrial sector innovative management in the context of digitalization. *Journal of Innovation and Entrepreneurship*, *11*(1), 53. <https://doi.org/10.1186/s13731-022-00247-y>
- Subramoniam, R., Parameswaran, A., Ramanan, R., Sreekumar, R., & Cherian, S. (2022). Generating trust using product genome mapping: A cure for ESG communication. In *2022 IEEE 1st global emerging technology blockchain forum: Blockchain & beyond (iGETblockchain)* (pp. 1–5). IEEE. <https://doi.org/10.1109/iGETblockchain56591.2022.10087063>
- United Nations. (2023). Progress towards the sustainable development goals: Towards a rescue plan for people and planet. *Report of the Secretary-General (special edition)*. <https://unstats.un.org/sdgs/files/report/2023/secretary-general-sdg-report-2023%2D%2DEN.pdf>
- Wang, J., Ma, M., Dong, T., & Zhang, Z. (2023). Do ESG ratings promote corporate green innovation? A quasi-natural experiment based on SynTao green finance’s ESG ratings. *International Review of Financial Analysis*, *87*, 102623. <https://doi.org/10.1016/j.irfa.2023.102623>
- Xia, J. (2022). A systematic review: How does organisational learning enable ESG performance (from 2001 to 2021)? *Sustainability*, *14*(24), 16962. <https://doi.org/10.3390/su142416962>
- Xu, J., Liu, F., & Shang, Y. (2021). R&D investment, ESG performance and green innovation performance: Evidence from China. *Kybernetes*, *50*(3), 737–756. <https://doi.org/10.1108/K-12-2019-0793>
- Zhang, C., & Jin, S. (2022). What drives sustainable development of enterprises? Focusing on ESG management and green technology innovation. *Sustainability*, *14*(18), 11695. <https://doi.org/10.3390/su141811695>
- Zhao, Q., Li, X., & Li, S. (2023). Analyzing the relationship between digital transformation strategy and ESG performance in large manufacturing enterprises: The mediating role of green innovation. *Sustainability*, *15*(13), 9998. <https://doi.org/10.3390/su15139998/>

https://www.scopus.com/authid/detail.uri?authorId=55895246100

← → ↻ scopus.com/authid/detail.uri?authorId=55895246100

Проверить доступ

### Davidenko, Lyudmila Mikhailovna

Toraiyghov University, Pavlodar, Kazakhstan 55895246100 <https://orcid.org/0000-0002-7541-8677> Смотреть больше

14 Цитирования из 11 документов | 11 Документы | 3 Выдачи Просмотр 5-дигитраны | [Просмотреть все параметры >](#)

[Редактировать профиль](#) [Подробнее](#)

**11 документов** | Показатели автора | Цитирование из 11 документов | 0 Препринты | 15 соавторов | 0 тем | 0 выданных грантов

**Примечание.**  
Пользователи Scopus Preview могут просматривать только последние 10 документов автора, и большинство других функций им недоступно. У вас есть [доступ](#) через учреждение? Воспользуйтесь доступом своего учреждения, чтобы просматривать все документы и пользоваться всеми функциями.

**11 документов**

Экспортировать все | Сохранить все в список | Сортировать по Дата (самые новые) | [Просмотреть список в формате результатов поиска](#)

**Conference Paper**  
Technologies of Eco-Branding of the Region's Industrial Complex  
Davidenko, L.M., Milic, M.A., Shaimova, N.M.  
Springer Proceedings in Business and Economics, 2024, страницы 413-423  
[Просмотреть реферат](#) | [Связанные документы](#) | [Цитирование](#) | [Просмотр пристрастных ссылок](#) | [Настроить оповещение о документах](#)

**Conference Paper**  
Technological Integration of Environmentally Friendly Industries as a Factor of ESG Transformation  
Davidenko, L.M., Milic, A.E., Bobemirova, A.N.  
Springer Proceedings in Business and Economics, 2024, страницы 367-376  
[Просмотреть реферат](#) | [Связанные документы](#) | [Цитирование](#)

**Должность автора**  
[Проверить доступ through your organization to view author position.](#)

First author - %  
Last author - %

← → ↻ scopus.com/sourceid/21101077468

Scopus Preview

Поиск авторов | Источники | [Создать учетную запись](#) | [Войти](#)

## Сведения об источнике

[Отзыв >](#) [Сравнить источники >](#)

**Springer Proceedings in Business and Economics**  
Годы охвата Scopus: от 2014 до 2024  
ISSN: 2198-7246 E-ISSN: 2198-7254  
Отрасль знаний: [Economics, Econometrics and Finance: General Economics, Econometrics and Finance](#)  
[Business, Management and Accounting: General Business, Management and Accounting](#)  
Тип источника: **Материалы конференции**

[Просмотреть все документы >](#) | [Настроить уведомление о документах](#) | [Сохранить в список источников](#)

CiteScore 2023 **0.7** | SJR 2023 **0.151** | SNIP 2023 **0.140**

CiteScore | CiteScore рейтинг и тренды | Содержание Scopus

CiteScore **2023** | CiteScoreTracker 2024

**0.7** = 1 739 цитирований за 2020 - 2023 гг. | **0.6** = 1 314 цитирований на текущую дату