УДК 332.1

Guo Jinhan[1], Elena Volkova[2]
[1]2-nd Year Postgraduate Student of the Department of Financial Control, Analysis and Audit of Belarusian State University
[2]Candidate of Economic Sciences, Associate Professor, Associate Professor of the Department of Financial Control, Analysis and Audit of Belarusian State University
Го Цзиньхань[1], Елена Константиновна Волкова[2]
[1]аспирант 2-го года обучения каф. финансового контроля, анализа и аудита Белорусского государственного университета
[2]канд. экон. наук, доц., доц. каф. финансового контроля, анализа и аудита Белорусского государственного университета
e-mail: [1]xiaohanjiejie@gmail.com; [2]gfu.vek@yandex.ru

ANALYSIS OF THE DEVELOPMENT TREND OF GREEN FINANCE IN CHINA

This paper explores the increasingly important role of green finance in China's economic strategy. Using a literature review and empirical research method, the paper explores the impact of policy, innovation and market demand on green finance and presents a diversified development trend driven by policy, market expansion and product innovation. The conclusions obtained are that policy support, market demand and technological innovation are the main drivers of China's green finance, creating a virtuous circle for the sustainable development of China's green finance. It is recommended to deepen international cooperation, strengthen risk management and enhance public awareness of green finance to fully realize the potential of green finance. Despite the challenges, this study highlights the fact that green finance can play a key role in achieving carbon neutrality and transforming the economy to a green and low-carbon model.

Key words: *green finance, sustainable development, development trend, China.*

Анализ тенденций развития «зеленых» финансов в Китае

Исследуется растущая роль «зеленых» финансов в экономической стратегии Китая. Используя обзор литературы, применяется метод эмпирического исследования, проводится анализ влияния политики, инноваций и рыночного спроса на «зеленое» финансирование. Представлена тенденция диверсифицированного развития, обусловленная политикой, расширением рынка и инновациями в продуктах. Сделан вывод, что политическая поддержка, рыночный спрос и технологические инновации являются основными движущими силами «зеленых» финансов Китая, создавая благоприятные условия для его устойчивого развития. Рекомендуется углублять международное сотрудничество, усиливать управление рисками и повышать осведомленность общественности о «зеленых» финансах, чтобы полностью реализовать потенциал этого инструмента развития. Сделан акцент на том, что «зеленое» финансирование может сыграть ключевую роль в достижении углеродной независимости и преобразовании экономики к «зеленой» и низкоуглеродной модели.

Ключевые слова: *зеленые финансы, устойчивое развитие, тенденции развития, Китай.*

Foreword

With the increasingly severe global environmental problems, green finance, as a key tool in promoting the economic transformation to green development, plays a crucial role in the development of China's economy.

As the world's largest developing country and a major emitter of carbon dioxide, China is facing a severe challenge of achieving the dual goals of economic growth and environmental protection [1–3].

Green finance arises in this background. It not only promotes the flow of capital to environmental protection projects and promotes the optimization of industrial structure, but also is a key way to achieve the United Nations Sustainable Development Goals (SDGs) [4].

Case analysis

In the future, the development trend of green finance in China will be reflected in the market expansion under the guidance of policies, the rich products and services under the mechanism innovation, and the green concept driven by market demand [5].

Green finance is not only limited to China (table 1), but also will further strengthen international cooperation and become an important financial instrument to support the sustainable development of China and even the world [6].

Table 1 – Policy guidance cases of China'green finance

Order number	Policy guidance cases	Mechanism innovation case	Market demand cases	Development trend prediction
1	The People's Bank of China issued the Catalogue of Projects Supported by Green Bonds	Industrial Bank launched the first green credit asset securitization product	Huawei Release the green sustainable development report and increase investment in the green supply chain	The green bond market will expand further
2	The National Development and Reform Commission issued the Guiding Catalogue of Green Industries	The Shanghai Pudong Development Bank has set up a green finance department to promote green finance business exclusively	Tencent announced the realization of 100 % green power procurement, to promote the green data centers	Green financial products and services will be more diversified
3	The China Banking and Insurance Regulatory Commission issued the Guidelines on Green Finance for the Banking and Insurance Industry	The Bank of Beijing has issued green financial bonds to support green transportation projects	Alibaba has proposed the «Green Double 11» initiative to promote the green development of the e-commerce industry	Green finance will be more deeply integrated into all industries
4	Government departments have set up pilot zones for green finance reform and innovation	The Industrial and Commercial Bank of China has launched a «green travel» credit card to encourage a low-carbon life	JD has launched a green supply chain plan to promote environmentally friendly products	The international cooperation in green finance will be further strengthened
5	The Ministry of Finance has issued a number of preferential tax policies for green bonds	The Agricultural Bank of China has launched green agriculture loans to support ecological agriculture projects	ByteDance adopt the green and energy-saving technology in the construction of the data center	Green finance will become an important tool to support sustainable development

Source note – The authors' own development.

Empirical research design is an important part of the development trend analysis of green finance in China, aiming to verify the rationality of theoretical prediction through rigorous data analysis.

The empirical research scheme of this study is called «Empirical Research on the Development Trend of Green Finance in China», and its core goal is to verify the consistency between the actual development of green finance in China.

In this paper, the data comes from the China's financial database, which records the dynamics of the green financial market in detail, including the issuance of green bonds.

At the same time, we will also extract specific information from the data of Chinese green bond issuance, as well as the green finance related data of listed companies, which will provide us with empirical evidence for enterprises to practice green finance.

The green finance policy document publicly released by the government will also become an important information for our understanding of the policy orientation.

In terms of variable selection, the development degree of green finance is set as the dependent variable, and specific indicators such as the issuance of green bonds.

Independent variables include government support for green finance, such as the number of policies; financial market maturity, reflecting market recognition of green finance; and enterprises' willingness to invest in green,

which will be obtained through questionnaires or public data.

Control variables include macroeconomic status, the level of industry development and environmental protection needs to ensure the robustness of the research results.

In the model construction stage, multiple linear regression model was adopted, and the above variables were included in the analysis to reveal the influence degree and interrelationship of each factor on the development degree of green finance.

We will query the data obtained through the financial database, combine the first-hand research data, conduct descriptive statistical analysis, correlation analysis and multiple linear regression analysis, to ensure the scientificity and effectiveness of the model.

The expected outcome will be to quantify the extent to which factors affect the development of green finance, which will help validate the predictions of theoretical analysis and provide a decision basis for policy makers and financial institutions.

However, we are also aware of possible research limitations, such as the data sources may not be comprehensive enough, some variables are difficult to quantify, and the findings may be influenced by the macroeconomic environment and policy changes.

Therefore, we will fully consider these potential effects when designing the study protocol to improve the reliability of the findings.

The following (table 2) is the introduction of the model selection indicators, and the data are all quarterly frequency data.

Table 2 – Indicator category of China's policy

Indicator category	Specific indicators	Data sources	Detail
Development of green finance (dependent variable)	Issuance scale of green bonds (100 million yuan)	The CEIC statistical database	From 2016 to the end of the first quarter of 2024, a total of 2,286 new green bonds were issued in China, with a scale of 3,65 trillion yuan
Green finance policy	Number of green finance policies issued by the government	The International Institute of Green Finance, Central University of Finance and Economics	In 2023, more than 10 major national green finance policies will be issued
Green-credit policy	Green credit increment	Oriental Fortune network data center	By the end of 2023, the balance of green credit was 30,08 trillion yuan
ESG invest	Number of ESG public offering funds	The International Institute of Green Finance, Central University of Finance and Economics	In 2022,50 new ESG public funds will be added
Macroeconomic situation	GDP rate of rise	Oriental Fortune network data center	China's GDP will grow by 3,0 % in 2022
Environmental protection needs	Total investment in the environmental protection industry	The CEIC statistical database	In 2022, the total investment in the environmental protection industry will be about 650 billion yuan
Green financial risk management	Green financial risk management measures and implementation cases	The International Institute of Green Finance, Central University of Finance and Economics	A number of green financial risk management guidelines have been issued, and 50 risk assessment projects have been launched

Source note – The authors' own development.

Experimental results and analysis

1. Descriptive statistical analysis

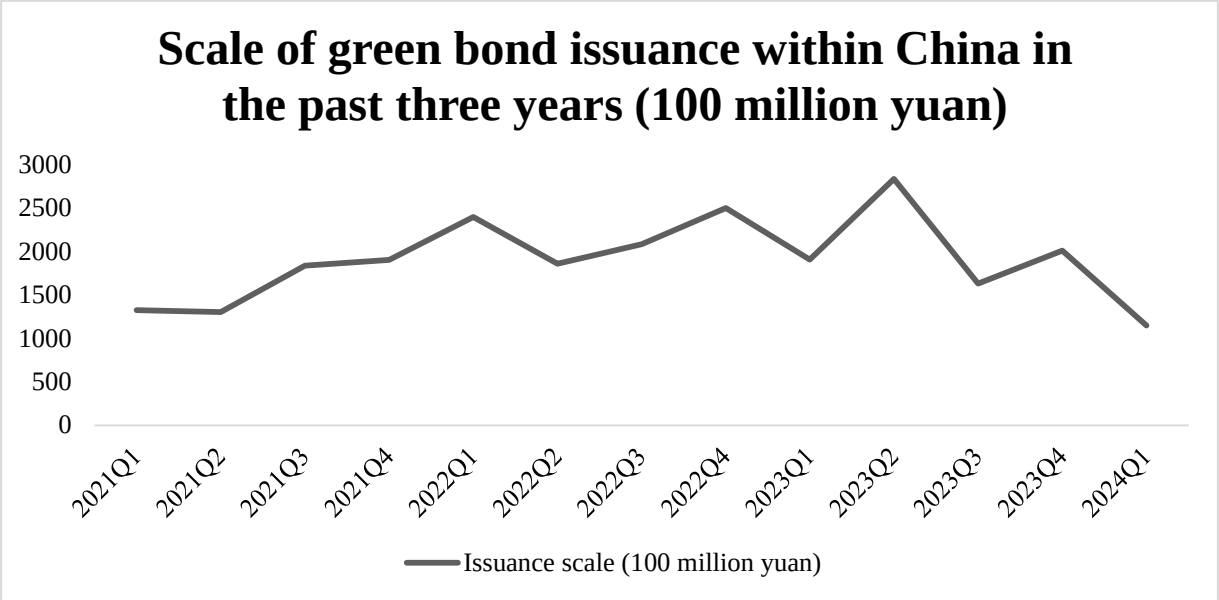

Figure 1 – Scale of green bond issuance within China in the past three years, 100 million yuan

Source note – The authors' own development.

First analysis of independent variables, nearly three years in China green bond issuance scale roughly presents the upward trend, in the perspective of China's green financial development fluctuation rising trend, since 2021 Q1 to 1300 yuan to 2023Q2 over 250 billion yuan, it can be seen in the period of rapid development, and Q22023 green bond issuance is cold.

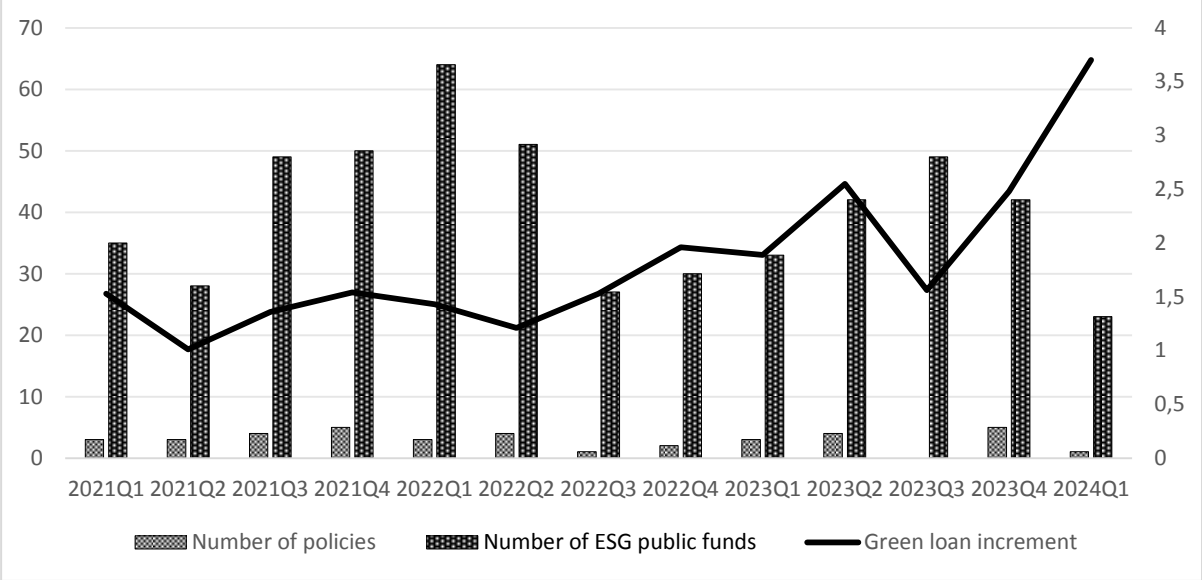

Figure 2 – Number of Policies and ESG public funds Source note: the authors' own development

Source note – The authors' own development.

Then the other three dependent variables were analyzed, among which the number of policies and the number of ESG public offering funds were seasonal in different quarters, while the increment of green loans showed a gradual upward trend.

2. Correlation analysis

Next, we conducted a correlation analysis of each variable to preliminarily judge the

impact of each factor on the development of green finance in China, so as to prepare for the following modeling.

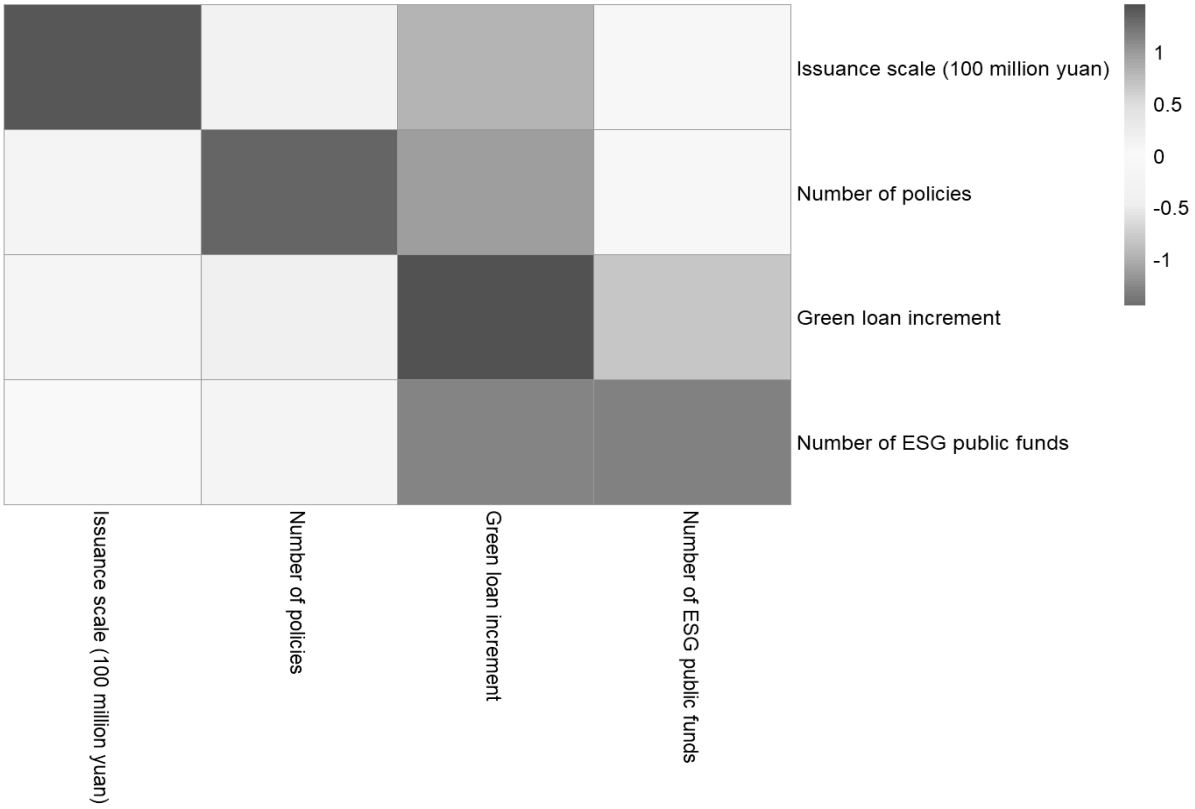

Figure 3 – Heatmap of modeling

Source note – The authors' own development.

Through the correlation analysis and drawing the heat map, we can see that the dependent variable Scale is positively correlated with the number of policies and the number of ESG public funds, and the correlation coefficient is between 0,25 and 0,40, while the correlation with the green loan increment is almost 0,3 Multivariate linear model construction.

We constructed a multiple regression model for the above four variables, and the regression coefficient estimates are as follows (table 3).

Table 3 – Multiple regression model result

	Estimate	Std. Error	t value	Pr
Intercrpt	993,36	817,82	1,215	0,255
Number of policies	45,85	104,5	0,39	0,671
Green loan increment	105,32	225,18	0,468	0,651
Number of ESG public funds	14,52	7,49	2,343	0,034

Source note – The authors' own development.

It can be seen that the variable Number of ESG public funds was significant in the model ($P < \alpha - 0.05$), but the remaining variables were not significant at the confidence level of $\alpha = 0.05$, which may be related to our sample size (short time interval). The goodness of fit of the model, R-square = 0,1837, indicated that the regression variables could explain 18,37 % of the changes of the dependent variable. The F statistic value of the model was 2,55 ($P = 0,022 < 0,05$), indicating that the model was overall significant.

According to the model results, we can see that the number of green policies, the in-

crement of green loans and the number of ESG funds all promote the development of green finance, but different variables have different effects, and the number of ESG funds plays the most significant role in the model and correlation analysis, and the largest role in promoting the development of green finance.

Here are the specific cases summarized from the model (table 4).

Table 4 – Specific cases

Order number	Empirical cases	Type of green finance projects	Amount invested (100 million yuan)	Emission reduction effect (tons CO2e)	Banking institution	Project leader	Influencing factor	Analysis of action mechanism
1	North China Wind Power Project	Clean energy	20	30	Bank of China	Zhang Hua	Policy support	Government subsidies and preferential tax policies have increased project revenue and promoted the development of green finance
2	The Yangtze River Water treatment project	Prevention and control of pollution	15	20	Agricultural bank	Li Ming	Environmental requirement	With the aggravation of environmental pollution problems, the demand for pollution prevention and control projects increases, which promotes the investment of green finance
3	Green building project	Building energy conservation	10	15	Bank for economic construction	Wang Qiang	Market demand	The growth of the market demand for energy-saving buildings has driven the investment of green finance and achieved a win-win situation between economy and environment
4	Northwest Photovoltaic Project	Renewable energy	25	35	ICBC	Chen Xiao	Technical progress	Continuous innovation in photovoltaic technology has reduced costs, improved project attractiveness, and increased participation in green finance

End of table 4

5	Green transportation project	Mass transit	18	25	Bank of communications	Liu Yang	Social responsibility	Financial institutions should undertake their social responsibilities, promote green transportation projects, reduce carbon emissions, and contribute to the development of green finance

Source note: the authors' own development.

3. Robustness test

In this section, we test the robustness of the constructed model. First, we look at the residual map of the model. We can see that the residue roughly fluctuates around 0, and there is no significant trend. It can be considered that the model residue roughly meets the 0 mean assumption.

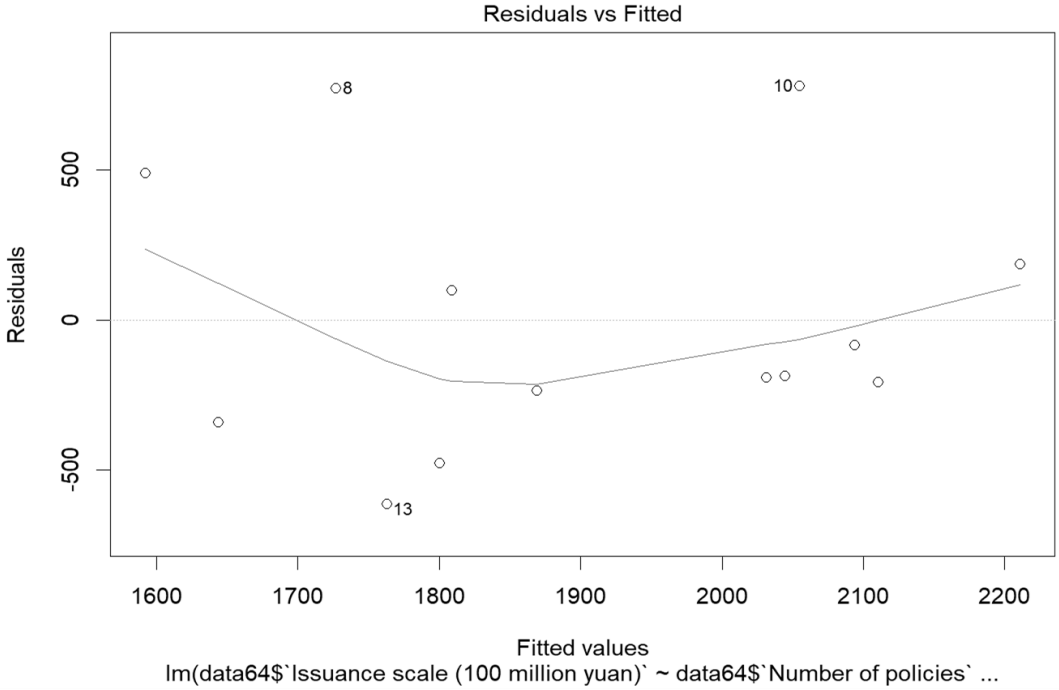

Figure 4 – Residual map of the model

Source note – The authors' own development.

Then we tested whether the model has a multicollinearity problem.

The VIF values of the three variables were less than 2, indicating that the model does not have multicollinearity (table 5).

Table 5 – VIF values of the three variables

Variable	VIF
Number of policies	1,187651
Green loan increment	1,188495
Number of ESG public funds	1,376555

Source note – The authors' own development.

Conclusion and discussion

After detailed theoretical analysis and empirical research, this paper deeply discusses the development trend of green finance in China. We find that in recent years, the Chinese government has attached more importance to green finance, and the introduction and implementation of relevant policies have promoted the rapid development of financial products such as green credit and green bonds. According to statistics from the People's Bank of China, from 2016 to 2020, the average annual growth rate of China's green bond issuance scale exceeded 30 %, showing the strong growth momentum of the green finance market. The development characteristics of green finance are clear policy orientation, increasing market demand and driven by technological innovation. Financial institutions gradually realize the long-term value of green investment, and green credit has become an important part of the banking business. However, the green financial products in the market still have problems such as information asymmetry and inaccurate risk pricing, which requires further market regulation and improvement. In the future, we suggest that China's green finance should deepen international cooperation, learn from the international advanced experience, and enhance the internationalization level of green finance. Strengthen the risk management of green finance, establish a more perfect environmental, social and governance (ESG) information disclosure system, and improve the efficiency of green investment decision-making for market participants. Education and training should be further strengthened to enhance the public's awareness of green finance and form a green finance culture of the whole society.

Looking ahead, with the urgency of the global climate change issue and the advancement of the domestic sustainable development goals, green finance has a broad development prospect in China. It is expected that green finance will become an important driving force for the strategic transformation of financial institutions, and will play a key role in achieving the goal of carbon neutrality and promoting the green and low-carbon transformation of the economy. However, as challenges and opportunities coexist, China's green finance still needs to constantly innovate and improve to adapt to the increasingly complex environment and social responsibility needs. The development of green finance in China has shown a positive trend, but it still faces many challenges. Through deepening theoretical research and practical exploration, we believe that green finance will play an increasingly important role in China's economic and social development, helping to help achieve a green, low-carbon and sustainable future.

REFERENCES

1. Longfei Z. Analysis on the development trend and challenge of financial management in China / Z. Longfei. – Modern Marketing (Next Ten-day issue), 2016. – 378 p.

2. Wei, H. Research on the Development mechanism of carbon finance of Chinese commercial banks under the threshold of green Development / H. Wei. – Wuhan University of Technology, 2019. – 27 p.

3. Jugang, G. Analysis of the influence of financial globalization on China's financial development / G. Jugang, H. Yongming. – Coastal enterprises and Technology, 2005. – 23 p.

4. Yahong, M. Research on the influence of China's financial Development on industrial green transformation / M. Yahong. – Lanzhou University, 2022. – 47 p.

5. Guoliang, H. The development trend of inclusive finance and its practice in China / H. Guoliang, L. Mengqi. – Discussion on modern economy, 2023. – 72 p.

6. Lazhu, S. Analysis of the opportunities, challenges and countermeasures facing the development of green finance in China / S. Lazhu. – Rural Economy and Science and Technology, 2018. – 91 p.

Рукапіс паступіў у рэдакцыю 02.07.2024