

STRUCTURAL APPROACH TO THE FORMATION OF THE BANK'S INDUSTRIAL LOAN PORTFOLIO ON THE BASIS OF SUSTAINABLE DEVELOPMENT

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Abstract. In bank-centred economies, banks are the leading financial institutions, and therefore the implementation of the principles of sustainable development through the instruments of "green" and "sustainable" finance depends on them. Given the historical links between banks and industrial capital, and the modern role of banks in the development of industrial enterprises, the question of taking into account the principles of sustainable development in bank lending to industrial enterprises as subjects causing catastrophic damage to the environment becomes particularly relevant. The *purpose of the article* is to provide a methodological substantiation of the peculiarities of taking into account the principles of sustainable development in the formation of a bank's industrial loan portfolio. To achieve this goal, the following tasks were solved: to clarify the criteria for taking into account the principles of sustainable development in the formation of the bank's industrial loan portfolio; to propose a structural approach to the formation of the bank's industrial loan portfolio on the basis of sustainable development. The *methodological basis* of the study is a synthesis of theoretical and practical research in the field of green and sustainable finance. *Practical implications.* The results of the study show that it is expedient to deepen the development of sustainable lending to industrial enterprises, since the concept of sustainable development is broader than green financing and includes all aspects of sustainable development – environmental, economic and social. *Value/originality.* The article clarifies scientific approaches to the definition of the concept of "sustainable development", identifies key principles of sustainable development, reveals financial aspects of implementation of the principles of sustainable development in the socio-economic life of society and substantiates the expediency of introducing the principles of sustainable development in bank lending to industrial enterprises. The criteria for taking into account the principles and goals of sustainable development in the formation of the bank's industrial loan portfolio are clarified and a structural approach to the formation of the industrial loan portfolio on the basis of sustainable development is proposed.

Key words: sustainable development, sustainable development goals, brown economy, green economy, blue economy, industrial enterprises, bank lending to industrial enterprises, loan portfolio of industrial enterprises.

JEL Classification: E23, E26, F60, F63, F64, G11, G21

1. Introduction

The current conditions of development of national and global economies are permeated by the integration of numerous environmental, social, scientific and technological, economic, political and military challenges. Industrial production in its modern form, the result of a series of scientific and technological revolutions,

remains in the spotlight, without denying the need to develop the services market, but rather combining efforts to create more advanced business models based on the principles of sustainable development (SDP) and to exploit the opportunities that are gradually opening up as a result of the Fourth Industrial Revolution. Despite a significant number of new approaches

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and innovations in industrial business, the problem of insufficient additional financial resources for development, modernisation, implementation of new projects, etc. remains relevant. Banks, with their strong analytical base and financial resources, contribute to solving this problem for industrial enterprises through lending. A relatively new milestone in the development of the banking business is its participation in the development of the "green", "blue" and "golden" economies, as well as in the development of "sustainable" financing. Since industries such as mining and mass production belong to the "brown" and "red" economic models, it is important to integrate SDPs into the credit relations between industrial enterprises and banks. Accordingly, the need to develop approaches to building the bank's industrial loan portfolio on the basis of sustainable development is becoming increasingly important.

Theoretical foundations and practical aspects of creation and development of "green" and "sustainable" finance have been studied by scientists, bankers, economists, in particular B. Kalas, M. Karlin, M. Khutorna, K. Markevycha, V. Mirovic, S. Ongena, H. Ozlem Dursun-de Neef, N. Prots, M. Rudenko, V. Sidenko, G. Tsonkova, O. Vovchenko and many other prominent researchers.

Paying tribute to the significant scientific achievements of researchers, certain aspects of implementing the principles of sustainable development in bank lending to industrial enterprises are currently ignored. It is believed that there is a need to clarify the criteria for taking into account the SDP when forming a bank's industrial loan portfolio and to develop a structural approach to the formation of a bank's industrial loan portfolio on the basis of sustainable development.

2. Prerequisites for the Formation of the Bank's Industrial Loan Portfolio on the Basis of Sustainable Development

Disclosure of the prerequisites for the formation of a bank's industrial loan portfolio on the basis of sustainable development requires, first of all, clarification of what is usually understood by the concept of "sustainable development". A common feature of sustainable development definitions is respect for the need to integrate economic and environmental aspects. Beyond this basic consideration, the commonalities between definitions of sustainable development are more subtle (Gallopín, 2001). The analysis of scientific literature has revealed that there is no single approach to defining this concept: "sustainable

Table 1

Systematisation of scientific approaches to the definition of "sustainable development"

Approach	Definition	Source
"Development" perspective	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.	<i>Brundtland Commission, 1987</i>
	Development in which growth does not exceed the assimilative capacity of the environment.	<i>Daly, 1990</i>
	The form of socio-economic development of society based on the post-industrial model of management and free creative labour, which takes into account the interests of current and future generations and is aimed at achieving a high level of environmental quality of life.	<i>Huzev, 2012</i>
"System" perspective	A system of social production relations that achieves an optimal balance between economic growth, normalisation of the quality of the environment and the growth of material and spiritual needs of the population.	<i>Danylyshyn & Shostak, 1999</i>
"Balance" and "Equilibrium" perspective	Sustainable development, i.e., development that has a balanced dynamic equilibrium between the components of an integrated ecosystem.	<i>Pradun, 2005</i>
	Environmental and economic balance in society.	<i>Hazyzullyn & Saidfudym, 1996</i>
"Process" perspective	The process of harmonising productive forces, meeting the essential needs of all members of society while preserving the integrity of the environment, and ensuring a balance between the potential of nature and the requirements of people of all generations.	<i>Shevchuk, 2010</i>

development" is considered by scientists as a "system", "balance, equilibrium", "process", "development", and so forth (Table 1).

As a forward-looking and promising development paradigm, sustainable development emphasises a positive trajectory of transformation based primarily on social, economic and environmental factors (Mensah, 2019).

As a result of the analysis of scientific literature, the following principles of sustainable development can be identified: protection of the ecosystem; feasible development of society; protection of biodiversity; population control; protection of nature; preservation of human resources; extension of people's participation; protection of cultural heritage; inclusion within the carrying capacity of the earth; mindful creation and use; prevention and precaution; monetary efficiency; cooperation and commitment; access to information (Principles of Sustainable Development).

In a nutshell, the main summary principle of sustainable development is the systematic integration of environmental, social and economic

concerns into all aspects of intergenerational decision-making (Mensah, 2019).

The implementation of these principles in the socio-economic life of society is facilitated by the Sustainable Development Goals set out in the UN General Assembly Resolution "Transforming our world: The 2030 Agenda for Sustainable Development" (UNECE).

It is important to clarify the financial aspects of the practical implementation of SDPs in socio-economic processes. It should be noted that today there are two main vectors of development of financial instruments for the implementation of SDPs: "green" finance and "sustainable" finance. Their main differences are presented in Table 2.

When considering the bank lending aspect of green and sustainable finance, the following differences should be taken into account (McBride & Fitts, 2023):

– In the case of a "green" loan, the loan proceeds must be used for a "green project". At this stage, there is no agreed definition of green projects. However, guidance published jointly by credit

Table 2

Defining features of green and sustainable finance

Criteria	Green finance	Sustainable finance
Primary objective	Rational use of natural resources and energy efficiency, including promoting the development of a low-carbon economy	Ensuring the proper welfare of the population, ensuring unconditional social justice while creating sustainable prospects for future generations
Development prerequisites	A clear understanding by society of the immediate ability of environmental risks to be financially materialised, i.e., transformed into financial losses	Real application of green and social and environmental financing mechanisms
Financial instruments of implementation	Green bonds; green loans; loans linked to environmental and climate-related sustainable development goals; blue bonds development goals; blue bonds	Sustainable bonds; sustainability-related bonds; social bonds
Institutional support	Climate Transition Finance Handbook	
	Green bond principles Green loan principles	Sustainability bond guidelines Principles of social bonds Principles of sustainability bonds
International institutions (associations) that promote the development of relevant forms of financing	Financial Stability Board United Nations Environment Programme World Bank International Finance Corporation European Investment Bank	
	Paris Agreement on Climate Change Green Infrastructure Investment Coalition Network for Greening the Financial System Green Climate Fund	Sustainable Finance and Banking Network

Source: (Khutorna, Rudenko, Vovchenko, 2023)

market industry bodies in Asia Pacific, Europe, North America and beyond provides a non-exhaustive list of "green" project categories, such as projects that invest in renewable energy and pollution prevention.

– The proceeds of a sustainability-linked loan are typically used for the borrower's general corporate purposes, which need not be "green" or "sustainable" in nature. Instead, certain economic characteristics of these loans (such as the applicable interest rate) are linked to the achievement of key performance indicators and sustainability performance targets. If achieved, these economic characteristics are typically adjusted in favour of the borrower.

Given these key differences, it is believed that a bank should consider SDPs when building its industrial loan portfolio as an important component of its corporate loan portfolio. This need can be justified in the following way:

– "Sustainable" bank lending to industrial enterprises implies a more comprehensive approach to the implementation of PSD in financial and credit relations between banks and industrial enterprises.

– "Sustainable" bank lending to industrial enterprises involves a wider range of loan products and services (not only lending for specific "green" projects, but also other types of lending, such as working capital replenishment, acquisition and modernisation of fixed assets, implementation of investment and innovation projects, etc.) to bring industrial borrowers closer to achieving specific SDGs as a result of lending.

– "Sustainable" lending to industrial enterprises helps to achieve a balance of economic, environmental, social and ethical vectors of development of the industrial sector of the economy.

3. Structural Approach for the Formation of the Bank's Industrial Loan Portfolio Based on the SDPs and SDGs

In accordance with the above, it is proposed to form the bank's industrial loan portfolio based on the SDPs and SDGs, guided by the following criteria:

1. The colour of the economic model of the industrial enterprise ("brown", "red", "green", "blue", "gold", etc.).

2. Alignment of bank lending targets for industrial enterprises with the SDGs.

First of all, it is necessary to clarify the main characteristics of the "brown", "red", "green", "blue" and "gold" economic models that can be used by industrial companies in their business activities. The "brown" economy focuses on economic growth through environmentally destructive forms of activity, particularly the extraction and burning of fossil fuels such as coal, oil and gas. One of the by-products of this economic model is the huge amounts of greenhouse gases that cause climate change. For example, the destructive effects on society and the environment caused by the activities of companies in the electricity, gas, steam and air conditioning industries under the "brown" economy model are manifested in significant emissions of greenhouse gases and other air pollutants, uncontrolled use of water resources, destruction of ecosystems, etc. The water supply, sewerage and waste management industries can also be elements of the "brown" economy, depending on the degree of implementation of modern technologies in these enterprises, as these industries have significant environmental impacts on the water environment and public health.

The "red" economy involves mass production and mass consumption. This model is derived from "Fordism", named after Henry Ford, who acted as if environmental resources were unlimited. This economic model focuses on reducing production costs by using a linear business model of resource extraction and waste production. The "red" economy is separate from social and environmental issues, making it an unsustainable economic system (Darwish, 2021).

The functioning of industrial enterprises in accordance with the green economy model involves a balanced approach to meeting the resource needs of modern society and ensuring sustainable development for future generations.

The "blue" economy is aimed at solving problems related to the conservation and rational use of water resources. The main efforts are directed at eliminating water pollution and recycling waste removed from the water environment.

The "golden" economy (also known as the solar economy) is aimed at solving the energy problem. The "golden" economy aims to overcome the destructive impact of the brown economy by replacing fossil fuels with renewable energy sources (wind, solar, hydro, geothermal, tidal, and so on), etc.

Given that the industrial loan portfolio constitutes a significant share of the bank's corporate loan portfolio and its main difference is its sectoral structure, it is advisable to apply a structural approach to the formation of the bank's industrial loan portfolio on the basis of sustainable development.

The advantages of using a structural approach to forming the bank's industrial loan portfolio on the basis of sustainable development are as follows:

- The structural approach involves focusing not on the specifics of individual elements of the studied set, but on the system of interrelationships between them.

- The structural approach involves determining the significance and priorities among factors, methods, principles and other instruments in their totality in order to establish a rational correlation and increase the validity of resource allocation.

In view of the above, the following structural approach to the formation of the bank's industrial loan portfolio on the basis of sustainable development is proposed:

- Identify priority areas for lending to industrial enterprises in line with the SDGs.
- Determine whether an industrial enterprise matches the economic model by colour ("brown", "red", "green", "blue", "gold", etc.).

- Identification of specific SDGs to be achieved as a result of lending to each specific industrial enterprise.

- Formation of the optimal structure of the industrial loan portfolio by defining a clear framework for lending based on the criterion of industrial enterprises' belonging to the economic model by colour and on the criterion of declaring the SDP in their activities.

- Improvement of the product line of loan products and services for industrial enterprises in line with the principles of sustainable development.

Therefore, it is suggested that the SDPs be taken into account when compiling an industrial loan portfolio by sector: mining and quarrying (Table 3); manufacturing (Table 4); electricity, gas, steam and air conditioning (Table 5); water supply, sewerage and waste management (Table 6).

An important structural component of an effective industrial loan portfolio based on the SDPs is the loan product. It is proposed that the SDP-based industrial loan portfolio should include loan products and services to industrial enterprises that operate on the basis of and in line with the SDGs (Figure 1).

Table 3

Integration of the SDGs into bank lending to mining companies

Color of the industry's economy	Linkage to the SDG	Lending structure
Brown economy	The 'brown' economy has a large number of well-documented destructive impacts. This applies to SDGs 3 "Good Health and Well-Being", 4 "Quality Education", 6 "Clean Water and Sanitation", 7 "Affordable and Clean Energy", 10 "Reduce Inequalities", 11 "Sustainable Cities and Communities", 12 "Responsible Consumption and Production", 13 "Climate Action", 14 "Life Below Water", 15 "Life on Land", 16 "Peace, Justice and Strong Institutions", and 17 "Partnerships for the Goals".	Mining companies that have a negative impact on the environment and are not socially and environmentally responsible should have significant restrictions on access to bank lending.
Green economy	Mitigating the destructive effects of the brown economy by gradually transitioning extractive industries and quarries to a green economy will have a positive impact on all 17 SDGs.	Extractive industry and quarrying companies working to reduce the negative impact of their activities on the environment and society (reducing emissions, using renewable resources, minimising waste, rational use of electricity, social responsibility, protecting biodiversity, etc.) receive flexible (preferential) lending terms.

Source: compiled by the authors

Table 4

Integration of the SDGs into bank lending to industrial enterprises

Color of the industry's economy	Linkage to the SDG	Lending framework
Red economy	The "red" economy has dire consequences for SDGs 6 "Clean Water and Sanitation", 9 "Industry, Innovation and Infrastructure", 11 "Sustainable Cities and Communities", 12 "Responsible Consumption and Production", 13 "Climate Action", 14 "Life Below Water" and 15 "Life on Land".	Processing companies that have not declared a reorientation towards achieving the SDGs and are engaged in irresponsible production and waste management should face significant restrictions on access to bank lending.
Green economy	The transition of manufacturing enterprises from the red to the green economy has the potential to achieve SDGs 1 "No Poverty", 2 "Zero Hunger" and 8 "Decent Work and Economic Growth".	Processing companies working to reduce the harmful impact of their operations on the environment and society (improving energy efficiency, minimising waste, using environmentally friendly materials in production, installing modern water and air purification systems, etc.) receive flexible (preferential) lending terms.

Source: compiled by the authors

Table 5

Mainstreaming the SDGs in bank lending to electricity, gas, steam and air conditioning companies

Color of the industry's economy	Linkage to the SDG	Lending framework
Brown economy	The destructive consequences of managing electricity, gas, steam and air conditioning companies on the basis of the brown economy relate to SDGs 3 "Good Health and Well-Being", 4 "Quality Education", 6 "Clean Water and Sanitation", 7 "Affordable and Clean Energy", 10 "Reduce Inequalities", 11 "Sustainable Cities and Communities", 12 "Responsible Consumption and Production", 13 "Climate Action", 14 "Life Below Water", 15 "Life on Land", 17 "Partnerships for the Goals".	Businesses in the electricity, gas, steam and air conditioning sectors that have not reoriented themselves towards the SDGs and whose activities are associated with environmental pollution and ecosystem destruction should face significant restrictions on access to bank lending.
Golden economy	The golden economy effectively addresses social and environmental challenges. While the golden economy indirectly contributes to many of the SDGs, it primarily contributes to Goals 7 "Affordable and Clean Energy" and 13 "Climate Action".	Electricity, gas, steam, and air conditioning companies that focus on the principles of sustainable development and the achievement of the SDGs in their business activities receive flexible (preferential) lending terms.

Source: compiled by the authors

4. Conclusions

The importance of bank lending to industrial enterprises in transforming the macroeconomic environment through its contribution to the development of scientific and technological progress is well known. At the same time, under the influence of the industrial revolution, the banking business itself and lending operations (especially to industrial companies with a significant impact on the environment) have changed in recent decades: many banking processes have been digitised; the process of deciding on the viability of a bank loan has

been accelerated; the bank's analytical and information resources have been improved by new data analysis and artificial intelligence tools; new types and forms of bank loans have developed (in digital currency, "green" loans, "sustainable" loans, etc.).

Considering certain aspects of the development of bank lending to industrial enterprises in the modern world, it is impossible to ignore the fact that industrial enterprises and their activities are the source of a number of negative environmental and socio-economic consequences.

Table 6

Integrating the SDGs into bank lending to water, wastewater and waste management companies

Color of the industry's economy	Linkage to the SDG	Lending framework
Brown economy	The destructive effects of managing water, wastewater and waste management companies according to the principles of the brown economy have a negative impact on the achievement of SDGs 3 "Good Health and Well-Being", 6 "Clean Water and Sanitation", 12 "Responsible Consumption and Production", 14 "Life Below Water", 16 "Peace, Justice and Strong Institutions" and 17 "Partnerships for the Goals".	Water supply, wastewater and waste management companies that have not reoriented themselves towards the SDGs and, accordingly, have not taken measures to reduce water pollution (in particular, adherence to the principles of rational water use, wastewater treatment using modern technologies, etc.) will face significant restrictions on access to bank lending.
Blue economy	The blue economy directly contributes to the achievement of SDGs 3 "Good Health and Well-Being", 6 "Clean Water and Sanitation", 12 "Responsible Consumption and Production", 14 "Life Below Water", 16 "Peace, Justice and Strong Institutions" and 17 "Partnerships for the Goals".	Enterprises in the water supply, wastewater and waste management sectors that focus on the principles of sustainable development and the achievement of the SDGs in their business activities and take appropriate measures receive flexible (preferential) lending terms.

Source: compiled by the authors

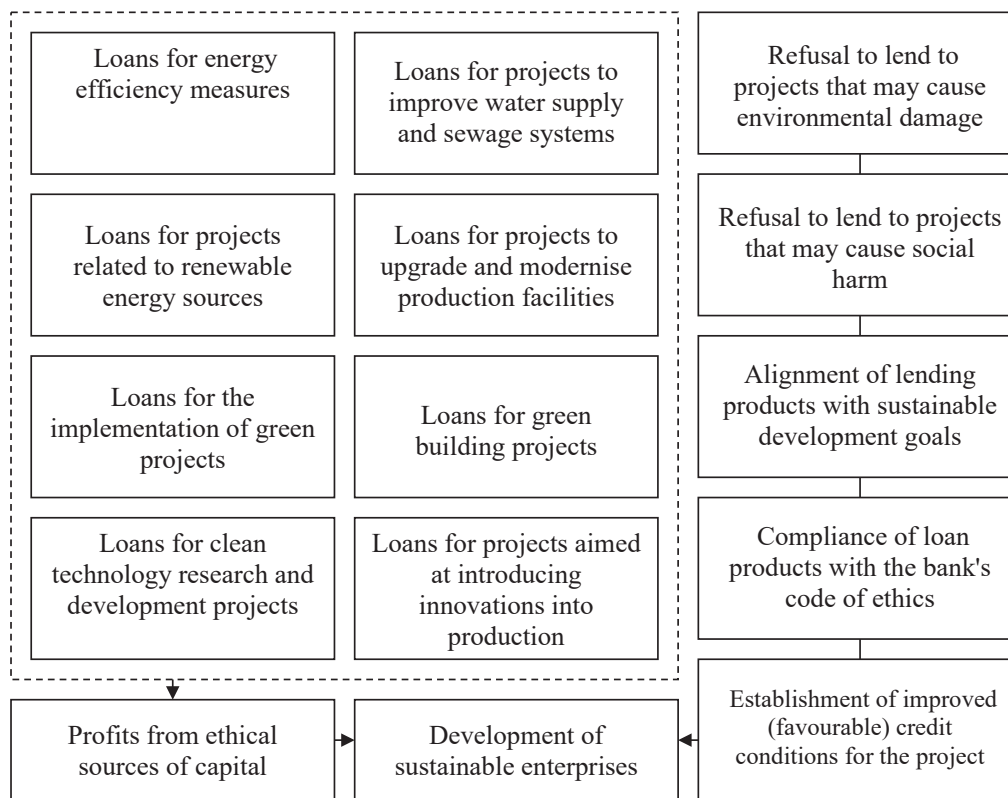


Figure 1. Socially responsible loan products for industrial enterprises

Source: compiled by the authors

Accordingly, banks, as one of the main sources of additional financial resources for industrial enterprises, should take into account the possibility of implementing the principles of sustainable development when lending to industrial enterprises.

The article offers the authors' vision of clarification of criteria of consideration of principles of sustainable development in the process of formation of the bank's industrial loan portfolio and, accordingly, offers a structural approach to formation of the bank's industrial

loan portfolio on the basis of sustainable development.

The authors believe that this approach contributes to the development of the sustainable banking paradigm and can increase the efficiency of the banking business on the basis

of sustainable development, increase competition between industrial enterprises in the struggle for more favourable and flexible lending terms, and, accordingly, strengthen their intentions to move to the principles of sustainable development.

References:

- Daly, E. Herman (1990). Toward some operational principles of sustainable development. *Ecological Economics*, 2: 1–6. Available at: <https://docs.ufpr.br/~jrgarcia/Economia%20Ecologica/Toward%20some%20operational%20principles%20of%20sustainable%20development.pdf>
- Danylyshyn, B., & Shostak, L. (1999). Sustainable development in the system of natural resource constraints. SOPS of Ukraine NANU, Kyiv. Ukraine.
- Darwish, R. (2021). Which Of The Seven Colors Of The Economy Will We Need Post-Pandemic? *Albawaba Business*. Available at: <https://www.albawaba.com/business/which-seven-colors-economy-will-we-need-post-pandemic>
- Hazyzullyn, N., & Saidfudym, P. (1996). Environmental and economic balance: a look into the future. *Scientific Tatarstan*, 1: 40–43.
- Huzev, M. (2012). Modern ecological problems as a reflection of modern economic problems. *Scientific works. Economy*, 177 (189), 6–9. Available at: <http://economy.chdu.edu.ua/article/viewFile/77339/73037>
- Khutorna, M., Rudenko, M., & Vovchenko, O. (2023). The market of investment financial services in the conditions of ecologization of the economic being and establishment of a sustainable development economy. *Financial Space*, 1: 97–119. DOI: [https://doi.org/10.30970/fp.1\(49\).2023.971189](https://doi.org/10.30970/fp.1(49).2023.971189)
- Gallopín, G. (2001). Science and technology, sustainability and sustainable development. Economic Commission for Latin America and the Caribbean. Available at: <https://repositorio.cepal.org/server/api/core/bitstreams/942d9a7a-147d-4365-b02d-2a48bcafe9d0/content>
- McBride, C. & Fitts, D. (2023). Green loans vs sustainable loans: what you need to know. Lexology. Available at: <https://www.lexology.com/library/detail.aspx?g=f77c1e11-40f7-4013-b5d5-be0c9b694766>
- Pradun, V. (2005). Economic and ecological bases of sustainable development of regional agro-industrial complexes. Doctoral dissertation. Joint Institute of Economics of the National Academy of Sciences of Ukraine, Kyiv.
- Mensah, Justice (2019). Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review. *Cogent Social Sciences*, 5 (1). DOI: <https://doi.org/10.1080/23311886.2019.1653531>
- Official web-site of the UNECE. Available at: <https://w3.unece.org/PXWeb/en>
- Principles of Sustainable Development. Available at: <https://www.geeksforgeeks.org/principles-of-sustainable-development/>
- Shevchuk, V. (2010). Formation of innovative model of sustainable development of Ukraine in post-crisis period. *Economic Journal-XXI*, 1(2): 6–8. Available at: <http://dspace.nbu.gov.ua/bitstream/handle/123456789/45383/02-Shevchuk.pdf?sequence=1>

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