

Formation of the model of Corporate Environmental Responsibility for oil and gas companies from the position of the concept of “Green” economy

Formación del modelo de Responsabilidad Ambiental Corporativa de las empresas de petróleo y gas desde la posición del concepto de economía "verde"

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Abstract

The activity of ecologically responsible enterprises is connected to choosing variants of interaction with nature and searching a compromise between reaching goals of business and society development. It is characterized by a wide range of effects having both microeconomic and macroeconomic focus. This article deals with the notion “corporate ecological responsibility” as a complex one, taking into account the standard ISO 14001. The purpose of the research consists in working out a new model of corporate ecological responsibility for oil and gas companies, adapted to the conditions of implementing a sustainable development concept in the stage of transition to green economy. The research used following methods: critical thinking, statistical, rating, expert, system analysis and content analysis ones. The research results were tested by OOO «LUKOIL-Perm», which is a business unit of a vertically integrated oil company «LUKOIL», one of the main oil products exporters on the world market. The authors concluded that the model of corporate ecological responsibility of oil and gas companies, developed taking into account the demands of modern society, is more efficient and justified than existing traditional models.

key words: sustainable development, green economy, competitiveness

Resumen

La actividad de empresas con conciencia ecológica está relacionada con la elección de las opciones de cooperación con el medio ambiente y con la búsqueda de un compromiso entre conseguir objetivos para el desarrollo de negocio y de la sociedad. Se caracteriza por una amplia gama de efectos que tienden más a la macroeconomía que a la microeconomía, y además influyen en los índices de la calidad de vida de la población. En este artículo el concepto “La responsabilidad ecológica corporativa” se considera en base a un criterio amplio, desde el punto de vista de los requisitos del estándar ISO 14001. El objetivo del estudio es elaborar un nuevo modelo de la responsabilidad ecológica de las empresas de petróleo y gas adaptada a las condiciones de la realización del concepto del desarrollo sostenible de la

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sociedad en la etapa de transición a la economía “verde”. Durante el estudio se empleó la metodología del pensamiento crítico, método estadístico, método de ranking, método de expertos, método del análisis sistémico, método de análisis de contenido. Los resultados del estudio fueron aprobados en la gestión empresarial de OOO “Lukoil – Perm” (sociedad limitada) que es una subdivisión estructural de la empresa petrolera de integración vertical “Lukoil”, uno de los mayores exportadores en el mercado mundial de los productos de petróleo. Se concluyó que el modelo de la corporativo responsabilidad ecológica de las empresas de petróleo y gas proyectado en vista de las exigencias de la sociedad moderna es más conveniente y razonable que los modelos tradicionales.

Palabras clave: desarrollo sostenible, economía verde, competitividad

1. Introduction

Economic activity of enterprises caused such a great damage to the environment that it led to the appearance of the sustainable development concept and strict demands to environmental protection, obligatory for all economic subjects. Nowadays the enterprises' competitiveness largely depends on rate of their environmental impact, participation in renewing natural resources, the ability to take responsibility for their business results.

Oil and gas industry is one of the most ecologically dangerous economic branches. It is characterized by a large land-use, a considerable polluting potential, and a high explosion and fire hazard of industrial objects. Chemical reagents, used in drilling wellholes, oil extraction and preparation, as well as extracted carbons themselves and their inclusions, are harmful for both flora and fauna, and humanity (Perfiljev and Solomatov, 2016). Emergencies, industrial accidents and disasters represent one of the main factors of environmental pollution.

The economic model, where oil and gas companies work highly efficient for business but with huge ecological risks for society, is called brown economy (Leskovskaya and Grigirieva, 2018). In 2008 the UN Development Program on environment (UNEP) put forward an initiative on green economy, which became an integral part of the sustainable development concept, having added several provisions dealing with actual aspects of business environmentalization, natural resource use, and the restoration of natural environment (UNO, 2019).

The concept of green economy provides a model leading to gain in health and social justice for population, as well as a considerable reduction in dangerous impacts on the environment and a decrease in ecological deficit. UNEP defines green economy as the instrument leading to an increase in people's welfare and social equality, and simultaneously considerably reducing negative effect on the environment and ecological degradation risks (UNO, 2019).

Nowadays oil and gas companies try to implement sustainable development principles in their entrepreneurial activity in order to achieve the balance between socio-economic and natural-ecological development. (Hymel, 2006). The decisions in oil and gas enterprises are made based on increased ecological responsibility, which guarantees a long-term balance between ecological integrity, social equality and economic efficiency in the context of society's sustainable development (Frini and Ben Amor, 2019). This demands a profound study of theory and practice of this corporate activity branch; the existing knowledge base in the sphere of corporate ecological responsibility should be brought in line with modern public values.

Theoretical research presents a big number of publications concerning the issues of companies' ecological responsibility and developing decision-making models in the sphere of their interaction with the environment.

The literature review showed that nowadays there is no unified notion «Corporate ecological responsibility (CER)». Different authors interpret this notion differently, trying to make it actual in modern economic conditions (Marshall and Brown, 2003; Gaevskaya, 2008; Belyaeva and Eskindarova, 2008; Kopytova, 2017; Bannikova et al, 2016; Blagov, 2015). Besides, international organizations, focused on conducting research in the sustainable development sphere, make a considerable contribution to the development of the CER notion (CSD, 2019; World

Bank, 2017; CCCR, 2019; EC, 2019). We consider the interpretation of CER notion, suggested by the World Bank, more suitable for oil and gas business: «CER constitutes a minimization of the organization’s internal activity impact on the environment with the maximal increase of welfare to achieve the desired goals in the sphere of sustainable development» (The World Bank, 2019).

Table 1
Methodological approaches to the development of
corporate model for business ecological responsibility

Authors	Methodological approach to the development of CER model
I.P. Kosyakova, A.A. Muzalevskaya	The management of CER constitutes an integral part of the enterprise’s ecological management model (Kosyakova, 2014; Muzalevskaya et al, 2016)
A.B. Caroll, V. I. Sigov, L.M. Simonova, M.S. Swartz	The CER management is included into a general model of the enterprise’s corporate social responsibility by singling out the environmental protection functions (Caroll and Shabana, 2010; Sigov, 2013; Simonova et al, 2018; Swartz and Gragg, 2017)
A.G. Dementyeva, L.N. Drobyshevskaya, T.Yu. Kostenkova, L.V. Kuznetsova	The CER management is partly singled out through special functions of individual blocks from a general corporate model of enterprise management (Dementyeva, 2011; Drobyshevskaya and Solomatina, 2011; Kostenkova 2013; Kuznetsova, 2012)
G. Auld, B. Bossink, M.V. Terekhina	The CER is considered in the frames of macroeconomic models, where enterprises are set demands in the environmental protection sphere according to actual tasks of society development (Auld et al, 2008; Bossink, 2013; Терехина, 2015).
International Organization for Standardization (ISO)	The CER management is foreseen in the frames of ISO standard 14001, based on developing a system of ecological management in an organization, according to the “Plan-Act-Analyze-Make Better” method (ISO, 2019).

It is worth noting that despite a big variety of CER notion statements, authors put the main emphasis on the fact that enterprises should observe the sustainable development principles such as:

- An increased attention to ecological consequences of the enterprises’ main activity, the reduction of negative impact on the environment and climate (Dignam and Galanis, 2015);
- The search for solutions and technological processes, which contribute to achieving the task of efficient nature management (Dignam and Galanis, 2015).

The research results showed that the majority of authors tries to use logic structural schemes, reflecting the sequence of making decisions in a certain management models to analyze and perfect the process of implementing corporate ecological responsibility (table no. 1). But there is no specialized model developed specifically for oil and gas enterprises and the demands of the green economy concept. Most often, the efficiency of actions on the increase of business ecological responsibility is estimated based on the criteria of companies’ financial and commercial effectiveness (Broadstock et al, 2018; Lin et al, 2015; Salama et al, 2018), whereas ecologically responsible behavior of enterprises is characterized by a broader variety of effects.

It should also be noted that oil and gas companies actively started to implement the concept of green economy; they have plenty of innovative experience in the sphere of corporate ecological responsibility implementation. However, these peculiarities are insufficiently taken into account, analyzed and generalized. In this sphere, the situation is created when theory lags behind economic practice.

Everything said above defines the actuality, purpose and tasks of the research. The purpose of the study consists in developing a new model of corporate ecological responsibility at oil and gas enterprises while implementing the concept of sustainable development in the transitional stage to green economy. Achieving the goal demanded the solution of following tasks:

- To analyze the impact of oil and gas companies on the environment, to actualize the directions of increasing the environmental responsibility of the oil and gas business for the current stage of economic development;
- To formulate specific functioning features of oil and gas enterprises, influencing the CER implementation process in oil and gas sector;
- To structure the corporate environmental responsibility model in oil and gas companies;
- To systematize the effects from implementing CER in oil and gas factories.

2. Methodology

The theoretical basis of the research was formed by the works of Russian and foreign scientists in the area of ecological responsibility concept development at enterprises; the existing methodological approaches to forming CER models; as well as regulatory and strategic documents, regulating the process of CER development at oil and gas factories in the transition to green economy.

The informational base of the research is made up by ecological responsibility rating of Russian oil and gas companies, drawn up by World Wild Life Foundation (WWF). We also used the information about OOO «LUKOIL-Perm» activity, who is the leader among 46 enterprises of the company «LUKOIL» by oil production volume.

Table 2 (table no. 2) represents the selection of indicators, characterizing the CER development level of Russian oil and gas enterprises for the period between 2014 – 2018, created by the authors based on WWF website (WWF, 2019) and previous research (Aleksandrova, 2019). The data of table 2 (table no. 2) show the change in the dynamics of the impact of Russian oil and gas enterprises on the environment. 5 out of 10 indicators showed the reduction of negative impact on the ecology by oil and gas business. The pollutants discharge into the atmosphere decreased by 32,3%; the rate of oil-dissolved gas recycling increased by 3,4%; the share of excess payments in the whole amount of payment for negative impact on the environment decreased by 21,5%; the emergency rate at pipelines dropped by 7,4 times; the cases of oil and oil product spillage have been almost completely ruled out. In addition, the trend towards increased land pollution has been overcome.

Table 2
The impact of Russian oil and gas companies on the environment

Impact indicators	2014	2015	2016	2017	2018
1. Specific gross emissions of pollutants into the atmosphere kg/ tfoe	3.16	2.09	1.92	2.48	2.13
2. Specific gross greenhouse emissions during oil extraction kg/ tfoe	no data	41.18	71.81	87.68	73.29
3. The rate of oil-dissolved gas recycling, %	84.88	85.90	88.21	86.7	86.93
4. Specific water disposal of polluted waste into surface watercourses m3 / tfoe - total	0.001	0.05	1.08	0.072	0.145
5. Specific water use for company's own needs m3 / tfoe – total	1.04	1.85	1.203	2.466	1.108
6. Waste recycling and neutralizing, the ratio of recycled and neutralized waste to the amount of waste, t/ t	0.65	0.84	0.76	0.69	0.61
7. Land pollution dynamics, the ration of polluted land area at the end of the year to the beginning of the year ha/ ha	0.18	0.17	0.19	0.31	0.18
8. Specific emergency frequency at pipelines pcs/ 1 ths. Km of pipelines	41.46	22.9	6.94	0.144	5.57
9. Specific amount of spilled oil and oil products, kg/ tfoe	0.001	0.06	0.69	0.0003	0.0001
10. The share of excess payments, % of the total payments for negative impact on ecology	38.22	25.94	28.67	29.02	30.0

Source: made by the authors based on Russian oil and gas enterprises' rating (WWF, 2019) using data (Aleksandrova, 2019)

Meanwhile there are negative tendencies in the dynamics of oil and gas companies' impact on the environment. They include an increase in specific greenhouse gases emissions during oil extraction process 1,77 times in 2018

compared to 2015. At the same time, no oil and gas enterprise has been showing such a high rise in oil extraction (WWF, 2019). The oil company «Novotek» showed the maximal level of oil extraction at 74% from 2015 to 2018. An important component of UNEP is the development and implementation of measures to reduce greenhouse gases emission. Russian oil and gas companies should increase their ecological responsibility first of all in this direction.

Other negative tendencies in the development of Russian oil and gas business include an increase in specific water disposal of polluted waste into surface watercourses 145 times from 2014 to 2018; a rise in specific water use for enterprises' own needs by 6,5% and a 6,1% drop in recycled and deactivated waste considering the average growth in the production volume of oil and gas companies by 8 – 10% for the given period (WWF, 2019). A increasing the scale of recycling and neutralizing of oil and gas waste

represents the second most important direction in the rise of ecological responsibility at Russian oil and gas companies in the nearest future.

Table 3 (table no. 3) shows the top best oil and gas companies in Russia in the sphere of ecological responsibility between 2014 and 2018. The company «Sakhalin Energy» has been the rating leader during several years. However, this is a company with a small rate of oil production and refining, which seems easier to minimize negative impact on the environment. Among big companies the leading positions in CER rating are taken by «Surgutneftegas», «Gazprom Neft», «LUKOIL» and «Rosneft». Here the oil company «LUKOIL» looks the most attractive, as it has increased its position from the 9th to the 4th place during 5 years, while its competitors have fallen down the rating. On the one hand, this can be explained by traditional high development of CER at «LUKOIL» group of companies. On the other hand, some decrease in rating of big oil companies such as «Surgutneftegas», «Gazprom Neft», and «Rosneft» can be explained by an active development of arctic oil fields, which generates additional ecological risks. Thus, the decrease in ecological risks during field development represents the third important CER direction for Russian oil and gas companies.

Table 3
Ecological Responsibility Rating of Russian oil and gas companies
for the period 2014–2018 yahre

Company name	The company's position in the rating by year				
	2014	2015	2016	2017	2018
Sakhalin Energy	2	3	1	1	1
Ekson NL	16	16	6	2	3
Surgutneftegas	1	1	3	3	5
SalymPetrolreum	6	7	5	4	8
Zarubezhneft	8	4	10	5	2
Gezprom	3	2	2	6	6
Gazprom Neft	10	10	8	7	9
LUKOIL	9	5	4	8	4
Rosneft	7	6	9	10	10
NOVATEK	12	12	7	12	13
Total number of companies in rating	19	19	18	19	22

Source: created by the authors based on the rating of oil and gas companies (WWF, 2019)

Three research hypotheses were formed based on the conducted statistical analysis:

1. Planning and purposeful implementation of measures to avoid environmental risks represent a more complex form of corporate ecological responsibility implementation, compared to a simple offset of actual expenses connected to compensation of actual damage to the nature;

2. The level of the company's ecological responsibility can be increased by using a more efficient CER model, focused on value paradigms of green economy and overcoming negative development trends of oil and gas business;
3. A new corporate model of oil and gas business ecological responsibility implementation contributes to improving the enterprise's management system as well as its economy as a whole.

The research process included critical thinking method, allowing to single out the problem areas; statistical method, rating method, expert method, system analysis method, content analysis method.

3. Results

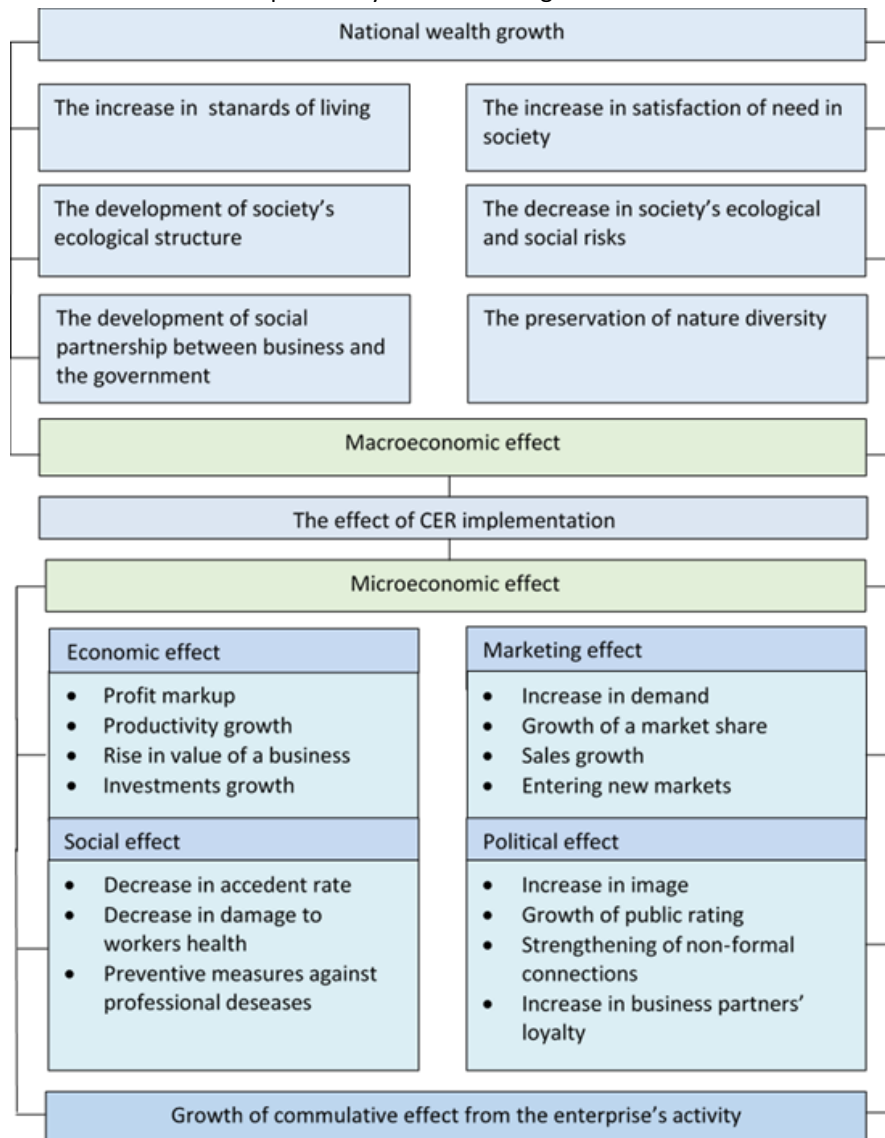
The modern scientific theory has developed different management models, which frames allow CER management; however, a specific CER model for oil and gas companies has not been identified yet. An objective reason for such situation is the complexity and variety of business processes in the oil and gas industry, which leads to a more labor-intensive process of the CER development and implementation for oil and gas enterprises.

The authors believe, that oil and gas sector of the economy possesses several peculiarities, defining the necessity of a special methodological approach to forming CER model at oil and gas enterprises, which include:

- The existence of two types of oil and gas enterprises, which are principally different by nature management. They are big vertically integrated oil companies (VIOC), and independent small and medium one (IOC). VIOCs focus on searching and developing major oil and gas fields. The IOC activity focuses on exploration and development of marginal fields and has a tendency to integrate into the system of big oil and gas business. (Motala at al, 2018).
- Major oil and gas fields have a limited territory. Now from the business development point of view, offshore oil and gas fields are very attractive, especially the ones, situated in Arctic. However, the potential of innovative technologies in oil-and-gas-field operation is not used actively in Russia. In general, Russian oil and gas business uses no more than 35% of discovered oil reserves. The world indicators in this sphere are much higher – 50% and more, which is explained by a rapid development of small and medium business (Kopytova, 2017).
- Oil and gas business is based on fragmented combination of different spheres. This contributes to a cumulative effect, which can show itself at different times and belong to different areas of public life (Humel, 2006). Specific ecological demands, which are placed on separate areas of oil and gas companies' activity, predefine, on the one hand, the variety of instruments in CER implementation; on the other hand, they specify a variety of effects, which can be obtained from ecologically responsible business (figure no.1).
- The leading oil and gas companies aim to achieve leadership in the area of oil and gas production and processing, including such business giants as Petroleum, Conoco Philips, Exxon Mobil, Royal Dutch Shell, Total and other biggest transnational corporations (Perfilyev, 2016). The list of the world leading oil companies includes three Russian companies: Rosneft, LUKOIL, Gazpromneft. The exporting firms should always take into account the trends towards a constant stiffening of ecological legislation regulations in importing countries, as well as growing demands of ecological standards to oil products quality (Sitnikov and Bocean, 2013; Uskova, 2016).
- Big oil and gas companies have a tendency to diversify their activity. They often buy firms working in unfamiliar business spheres or on the innovation market. In these indefinite economic conditions the reputation of the ecologically responsible enterprise can be considered as an instrument to develop the brand and corporate communications (Shah, 2014).
- The territorial location of oil and gas business largely defines its specific features of CER implementation. They have national and regional character, which is determined by oil and gas deposits on a specific territory, the length of pipelines, ecological state, and the regional standards of living.

- Oil and gas companies are characterized by a complex highly risky technologic process, due to that, the increase in their CER is closely connected to working out and implementation of innovations in the area of ecological security, such as developing energy saving programs, raising energy efficiency, using low-waste, non-waste and resource-saving technologies (Sergienko and Pavlova, 2018). Moreover, the environmental friendliness demands to production are spread to all business partners of the supply chain (Tammela et al, 2016; Glebova and Volokhina, 2017).

Figure 1
The effect from implementing corporate ecological responsibility of the oil and gas business



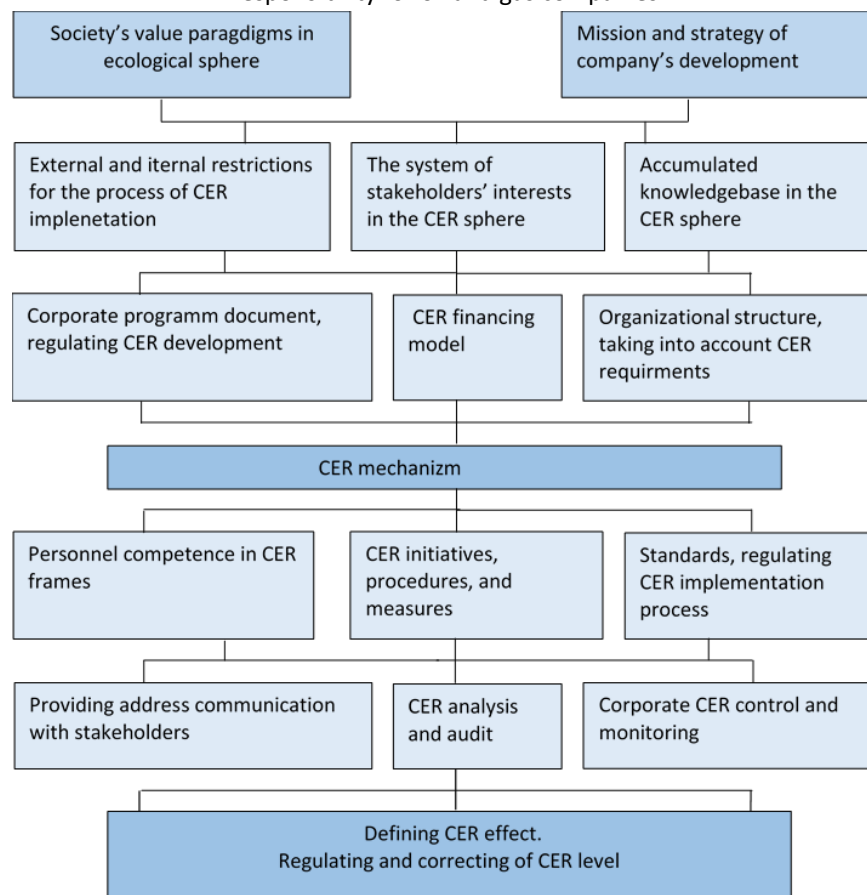
Source: authors' own development

- Oil companies actively invest part of their profit into development of national and international projects. In the investment activity, a high level of CER can be considered as an additional efficiency criteria, guarantying investors the possibility to receive an increased profit from participating in projects.
- The complication of the environment leads to an increase in the number of stakeholders, that oil companies need cooperate. Taking into account the interests of different stakeholders allows to improve relations with

them, to avoid a possible conflict of interests, and to increase the environment’s loyalty to the accepted decisions.

Having regard to the above, one can put forward the idea that it would be wrong to project existing methodological approaches fully to building CER models to the management process of ecological responsibility in oil and gas companies. It is necessary to use a special model, taking into account specific features of business administration in oil and gas industry in order to reach a higher CER level in this sphere.

Figure 2
Model of corporate environmental responsibility for oil and gas companies



Source: authors’ own development

Relating to the task of building corporate ecological responsibility model at oil and gas companies, we recommend using a combined variant, taking into account both structural elements of corporate management system and functional direction of the international standard ISO 14001 (ISO, 2019), regulating the activity of ecologically responsible oil and gas companies.

Figure 2 presents the model developed by the authors (figure no.2). It includes 5 blocks, each of them has its structure and performs a certain function to provide CER implementation:

- Block 1. It includes two elements: society’s value paradigms in ecological sphere and strategic aims of company’s development. It performs the goal-setting function.
- Block 2. It consists of 6 elements, including: external and internal restrictions, stakeholders’ interests, accumulated knowledgebase, enterprise’s organizational structure, financing model, corporate program documents, regulating the development of the company’s ecological responsibility.

- Block 3. It represents the CER mechanism, which should be understood as a complex of interconnected elements, providing CER activation to achieve a higher economic efficiency by balancing economic and ecological aims of business development. Figure 3 presents the structure of CER mechanism (figure no. 3).
- Block 4. It consists of 6 elements: defining staff competence; development of CER initiatives and measures; providing the accordance with standards; providing the connection with stakeholders; CER audit and analysis; CER control and monitoring. This block is necessary to organize the company's activity in CER sphere.
- Block 5. It is a resulting block in the model. It is aimed at defining effects from CER implementation for a certain period of time (figure no.1), as well as for implementing regulatory influence CER level when internal and external environment conditions change.

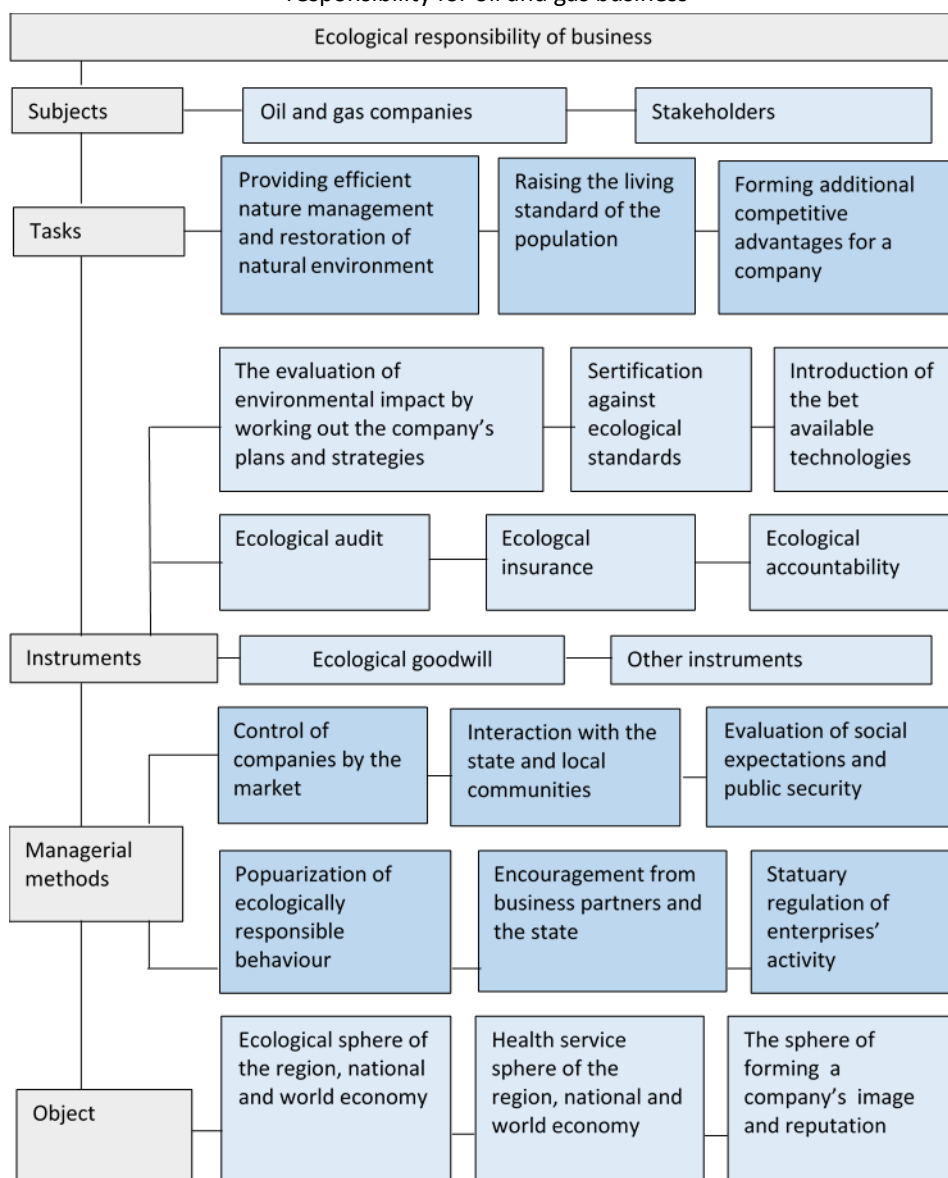
The main research results can be used at oil and gas enterprises to organize CER management, at scientific-research and expert organizations when developing ecological programs and projects; at public control and administrative authorities when working out governmental social and economic policies.

In 2018 the corporate ecological responsibility model, developed by the authors, was tested in managerial practice of OOO «LUKOIL- Perm», in the part of managing nature protecting activity and industrial security. The enterprise performs these activities in accordance with Ecological security program of «LUKOIL» group organizations.

In 2017 OOO «LUKOIL-Perm» received a compliance certificate of the enterprise's industrial security management system with the international standard ISO 14001 (ISO, 2019). In this connection, the company faced the challenge to adapt the established managerial practice to new business trends, re-focusing of business on reaching the balance between economic and ecological development purposes.

OOO «LUKOIL-Perm» managed to unite the interests and resources of different managerial and production departments of the company for joint solutions of Ecological Security Program tasks by acquiring a new organizational model to increase the business ecological responsibility in the conditions of introducing the international ISO 14001 standard. It also allowed to increase the coordination level of managerial apparatus departments and services activities in implementation processes of the business corporate ecological responsibility.

Figure 3
The mechanism structure of corporate ecological responsibility for oil and gas business



Source: authors' own development

The taken actions led to positive effects. For example, in 2018 OOO «LUKOIL-Perm» increased the investments into environmental protection by 8%, the number of performed ecological campaigns by 50%, it decreased the raw water intake from surface watercourses by 7%, and the pollutant emissions into the atmosphere by 14%. Also in 2018 the company set up the system of intellectual stimulation and planning of oil extraction process at its production units; it used innovative well site building technologies more often, and it started to introduce the «Economical production» system. At the end of the year OOO «LUKOIL-Perm» became the winner of the contest in the category «Stable high results» (table no. 4).

Table 4
The influence of a new corporate ecological responsibility model on the performance indicators of OOO «LUKOIL-Perm»

Indicator	2017	2018
The rise in environmental protection investments	3%	8%
The number of implemented ecological campaigns	6	9
The participation in off-shore fields development	no	yes
The decrease in ecological information preparation time for stakeholders	no	yes
The decrease in raw water intake from surface watercourses	5%	7%
The decrease in pollutant emissions into the atmosphere	8%	14%
The victory in the contest of «LUKOIL» group of companies in the category «Stable high results»	no	yes
The number of new well sites	91	118
The number of subdivisions implementing the pilot project «Intellectual field»	1	3
The increase in well site construction speed due to the use of new technologies	3%	7%
The number of subdivisions using integrated simulation and planning of oil products extraction	1	3
The introduction of «Economical production system»	no	yes

Source: developed by the authors based on the data provided by OOO «LUKOIL-Perm»

However, there were some difficulties from implementing this model alongside with the positive effect. They were connected to the fact that the development and implementation procedure to increase the company's ecological responsibility became more complicated, many-sided, and labor-intensive. The managerial and production specialists needed a higher qualification level, more profound knowledge about methods and instruments of CER implementation in transition to green economy, activity coordination technologies with other staff members, and ways of interaction with stakeholders. OOO «LUKOIL-Perm» organized a special training in the sphere of industrial security and labour protection to solve the problem of staff's deficient knowledge. It also introduced the workers' personal responsibility for compliance with the ISO 14001 standard requirements.

4. Conclusions

The research results allowed to identify specific features of oil and gas business, which make the process of purposeful development and implementation of measures to increase the ecological responsibility at oil and gas companies more complicated. This also confirms the first hypothesis efficacy.

The authors justified the necessity to develop a new corporate ecological responsibility model for oil and gas companies at the current societal development stage, which is characterized by business focus on compliance with the requirements of international ecological standards and value paradigms of the world green economy concept. They analyzed the new corporate ecological responsibility model influence on the entrepreneurial activity indicators of OOO «LUKOIL-Perm». The analysis results showed positive effects, witnessing the increase in CER of the company under study that confirms the validity of the second research hypothesis.

As far as the third hypothesis is concerned, it confirmed partly. This means that the increase in the level of production and management «ecologization» not only contributes to the improvement of the enterprise's productive and managerial activity, but also produces new challenges, connected to applying new knowledge

and skills in practice. The company's managers need to identify such problems quickly and take measures to develop new competencies in the staff.

If we use the discussed corporate ecological responsibility model in practical business activity of oil and gas companies, it will allow to formalize the process of making managerial decisions in environmental protection sphere. It will also help to identify more reasonably the peculiarities of corporate ecological responsibility implementation for separate company's subdivisions and stakeholders; it will provide a quicker and more efficient transition to ecological standard ISO 14001 and will contribute to reduction of negative impact on the environment and human health during the processes of oil extraction, processing and transportation.

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