



Corporate Portfolio of the Oil and Gas Production Enterprise

Olga Viktorovna Lenkova*

Federal State Budget Educational Institution of Higher Education, Industrial University of Tyumen, Volodarskogo, 38625000 Tyumen, Russia. *Email: olga_lenkova@mail.ru

ABSTRACT

This article offers a methodological approach to the analysis of a corporate business portfolio of the oil and gas production company. The sequence of steps for the implementation of analytical procedures is denoted. The choice of one of the traditional instruments of portfolio analysis - GE/McKinsey matrix - as a basis for the transformation (adaptation) is justified. Modification is carried out in relation to filling these tools with specific criteria and designation of borderline values of indicators at the demarcation of the portfolio into quadrants (sectors). At the same time, various sets of performance indicators are suggested for the evaluation of domestic and foreign projects in the portfolio. The results of testing the authors' recommendations on the example of a major Russian vertically integrated oil and gas company are provided. On the basis of analysis of the company's portfolio in the "Production" direction, general recommendations for its development in the context of domestic and foreign projects are given.

Keywords: Corporate Business Portfolio, Portfolio Analysis, Oil and Gas Company, Oil Production

JEL Classifications: J44, M14

1. INTRODUCTION

According to the forecasts, in the next 20 years, an increase in demand for products of oil and gas industry is expected in the world with the deterioration of geological and climatic conditions of extraction of raw materials and changes in the traditional geographic patterns of consumption (Baikov and Grinkevich, 2009). For vertically integrated oil and gas companies (VIOCs), this means increased competition for raw materials and refining capacities. With the growing dynamism of the external environment, a well-designed corporate business development strategy becomes a key success factor (The World Bank, n.d.). At the same time, despite the variety of existing methods of strategic analysis and planning, their application to such business entities with strong industry specifics requires preliminary adaptation procedures. This paper demonstrates the author's approach assuming the modification of portfolio analysis tools to the conditions of operation of oil and gas companies.

2. METHODOLOGY

It should be noted that the basic strategy of the VIOC, due to the complexity of its structure, will always be compound, combining

the elements of growth and reduction strategies. The following problems should be consistently solved in order to design a compound strategy:

1. Present the company as a portfolio of strategic business units allocated by technological grounds in its structure.
2. Select the reference strategy for each level, using the strategic management tools based on evaluation of the unit's potential and external environment of the company operation.
3. Adjust the units' strategies to bring them into a combined reference strategy of the company in general on the basis of ideas about the balance of the units work, as well as on the basis of assessment of conformity of the selected strategies to organization's goals and strategies.

Portfolio corporate strategy should be developed within each technological level of the company, taking any of the portfolio tools as the methodological basis (Basovsky, 2014; Guskov, 2014). In this paper, the choice is made in favor of the GE/McKinsey matrix, because:

1. GE/McKinsey matrix allows to distribute investments among business units of the organization's portfolio so as to maximize the return on investment (Kazakova et al., 2014; Markova and

Kuznetsova, 2014). It is noteworthy that the general goal of VIOC’s development, as a rule, is a balance of sustainability and profitability criteria. If profitability becomes a priority for the company in a certain period, GE/McKinsey matrix allows to maximize cash flow from operations by means of focusing on the most profitable projects. If resistance comes to the fore, the rational allocation of cash flow among business units of the organization’s portfolios allows to distribute the necessary funds for long-term investments.

2. GE/McKinsey matrix allows to characterize the position of the business unit with the help of two complex parameters (Mintzberg et al., 2011; Thomson and Strickl, 2013), which increases the accuracy of the estimate of both the attractiveness of the industry of the business unit functioning and its success/competitiveness.

Let’s illustrate the expected effectiveness of the adaptation of this portfolio decision-making tool on the example of the portfolio of the business units of the VIOC in the “production” direction of activity. To do this, we will allocate the assessed business units in each direction, a set of parameters at which the integral coordinate values for each unit will be determined, and then offer recommendations on the results of the analysis.

Let’s consider the producing fields as the portfolio of business units of the oil and gas company in the “production” direction of activity. At the same time, let’s carry out a separate comparison of Russian deposits and foreign projects, because, firstly, the parameters that characterize the success of the Russian and foreign projects in oil and gas production differ. Secondly, the vastness of the territory of Russia suggests a wide variety of geological conditions for oil and gas production. There are several oil and gas provinces on the territory of Russia, which makes it possible to evaluate them as more or less attractive regions of the company operation, while it is advisable to compare the foreign projects with a breakdown into the individual countries. Accordingly, the parameters of the assessment of the regions of location of the Russian and foreign deposits will also differ.

The modified GE/McKinsey matrix for the purposes of the portfolio analysis of the producing business units may be as follows (Figure 1).

Table 1: Indicators of success of Russian development projects

Criterion	Range of estimates				
	1	2	3	4	5
	Low	Low/average	Average	Average/high	High
Density, API	>38.82	36.35-38.82	34.23-36.35	31.76-34.23	<31.76
Sulfur content, %	>0.83	0.76-0.83	0.69-0.76	0.62-0.69	<0.62
Proven reserves, mln. barrels of oil	<189.23	189.23-268.08	268.08-362.69	362.69-441.54	>441.54
Annual production, thous. tons	<1561.61	1561.61-2212.29	2212.29-2993.09	2993.09-3643.77	>3643.77
Cumulative production, mln. tons	>82.25	67.56-82.25	49.94-67.56	35.25-49.94	<35.25
Proportion of production wells in the general fund, units	<0.38	0.38-0.54	0.54-0.72	0.72-0.88	>0.88
Proportion of wells that provide products in the operational fund, units	<0.81	0.81-0.86	0.86-0.89	0.89-0.94	>0.94
Average well flow rate, tons/day	<36.27	36.27-51.38	51.38-69.51	69.51-84.62	>84.62
Water cut, %	>90.29	74.17-90.29	54.82-74.17	38.70-54.82	<38.70
Validity of the license, year of expiration	<2020	2020-2035	2035-2045	2045-2060	>2060

Considering the Russian fields, it is proposed to assess the success of their production based on the parameters listed in Table 1.

The first two parameters characterize the quality of crude oil produced at the field, third to fifth give an indication of the stage of development, 6th-9th are a set of performance indicators, the latter figure is the period of validity of the license. The borderline values of the criteria are justified individually for each object of study (VIOC). In this case, they are formed for LUKOIL fields based on published data. It should be noted that the set of parameters to be estimated and their critical values listed in Table 1 and the following tables are not undeniable and can be adjusted.

Regions of locations of Russian fields are suggested to estimate by the following set of parameters (Table 2).

The first two parameters characterize the current efficiency of the production region, 3rd-10th characterize its promising efficiency, 11th-14th influence the economic feasibility of development (oil price will depend on its quality parameters, cost of its production will depend on the development of infrastructure, size and location of the fields). Borderline values of parameters are justified on the basis of a set of company-specific production regions; in this paper, the borderline values are calculated for LUKOIL.

Further, the coordinates of each business unit position in the matrix are determined according to the developed scales (Table 3), and they are displayed on the matrix in the form of a circle with a center defined by calculated coordinates and a diameter proportional to the production share of this field in the total production volume of the company in the Russian fields (Figure 2).

Depending on the business unit position in the matrix, the following recommendations to invest in the business unit of the “production” direction can be offered (Table 4).

Figure 1: Matrix “attractiveness of the region/success of the field production”

Attractiveness of the region		
Question	Winner 2	Winner 1
Loser 1	Medium business	Winner 3
Loser 3	Loser 2	Profit creator

Success of the field production

Table 2: Indicators of the attractiveness of the region of the field location

Criterion	Range of estimates				
	1	2	3	4	5
	Low	Low/average	Average	Average/high	High
Oil and condensate production per year, mln. tons	<32.4	32.4-45.9	45.9-62.1	62.1-75.6	>75.6
Growth of oil production per year, %	<2.4	2.4-3.4	3.4-4.6	4.6-5.6	>5.6
Average depletion of reserves, %	>88.2	72.45-88.2	53.55-72.45	37.8-53.55	<37.8
Proportion of developed fields in the discovered, %	>74.76	61.41-74.76	45.39-61.41	32.04-45.39	<32.4
Oil production 2008-2030, mln. tons	<642.6	642.6-910.35	910.35-1231.65	1231.65-1499.4	>1499.4
Growth of oil reserves 2008-2030, bln. tons	<3	3-4.25	4.25-5.75	5.75-7	>7
Gas production 2008-2030, bln. m ³	<282	282-399.5	399.5-540.5	540.5-658	>658
Growth of gas reserves 2008-2030, trln. m ³	<6.5	6.5-9.35	9.35-12.65	12.65-15.4	>15.4
Condensate production 2008-2030, mln. tons	<5.7	5.7-8.075	8.075-10.925	10.925-13.3	>13.3
Growth of condensate reserves 2008-2030, mln. tons	<201	201-284.75	284.75-385.25	385.25-469	>469
Oil quality, indicator K ¹	>1.4	1.15-1.4	0.85-1.15	0.6-0.85	<0.6
Characteristics of fields	Small, geographically dispersed	/	Average	/	Extra-large, close to each other
Development of infrastructure	Not developed	/	Developed	/	Highly developed

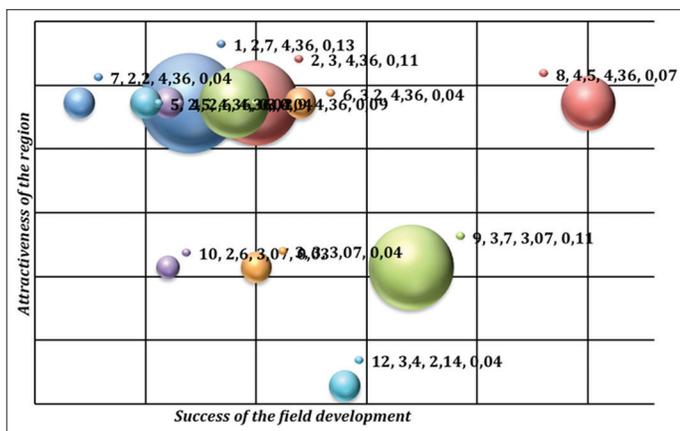
¹Indicator K is the resulting complex (integral) indicator comprising the values of sulfur content, concentrations of chloride salts, oil density and the content of fractions in oil at a temperature up to 200, 300 and 350°C

Table 3: Data for the construction of the matrix for LUKOIL fields in Russia (fragment)

Field	Field characteristic (X)	Region characteristic (Y)	Share in the company's production in Russia (d)
Tevlinsko-Russkinskoye	2.70	4.36	0.13
Vat-Eganskoye	3.00	4.36	0.11
Povhovskoye	2.90	4.36	0.09
Uzhno-Yagunskoye	2.60	4.36	0.04
...

prospects of development, 6th-10th are a set of performance indicators, the last two parameters characterize the possibility of the company participation in the project. It is important to note that the reserves and volume of production are represented in the company's share in the project. Borderline values of the criteria are justified individually for each object of study (oil company). In this case, they are formed for LUKOIL fields.

The attractiveness of the foreign project location is proposed to estimate by the set of parameters shown in Table 6.

Figure 2: Portfolio of JSC "LUKOIL" fields in Russia

- (1) Tevlinsko-Russkinskoye, (2) Vat-Eganskoye, (3) Povhovskoye,
- (4) Uzhno-Yagunskoye, (5) Pokachevskoye, (6) Kogalymskoye,
- (7) Uryevskoye, (8) Nakhodkinskoye (in oil equivalent),
- (9) Uzhno-Khylchuyuskoye, (10) Usinskoye, (11) Kharyaginskoye,
- (12) Pamyatno-Sasovskoye

With regard to the evaluation of foreign projects, it is suggested to evaluate success of their development by indicators shown in Table 5.

The first two parameters characterize the quality of crude oil produced from the field, third to fifth give an idea about the

The first eight parameters characterize the state of the legal regulation of business in the country, 9th-18th characterize the economic situation, 19th-21st characterize social environment, the latter figure is an indirect indicator of the technological development of the region. Borderline values of the parameters are justified on the basis of a set of the company-specific production regions; in this paper, the borderline values are calculated for LUKOIL. Initial data are estimates of the World Bank experts provided for public use on the official website of the organization (The World Bank, n.d.).

Further, according to the developed scales, the coordinates of the location within the matrix are determined (Andreichikov and Andreichikova, 2013; Ansoff, 1989) for each field of the company (Table 7), and they are represented on the GE/McKinsey matrix in the form of a circle whose center is defined by calculated coordinates and the diameter is proportional to the production share on this field in the company's total production at foreign fields (Figure 3).

The recommendations presented in Table 8 can be suggested for LUKOIL foreign projects.

3. RESULTS

The article provides importance and denotes complexity of managing corporate business portfolio of the oil and gas holding.

Table 4: Recommendations for the matrix quadrants

Quadrant	Characteristic	Strategic decision	JSC "LUKOIL" fields
Winner 1	Field located in a promising OGP, characterized by high performance indicators	Invest in the continued development with a view to maintain high performance indicators; ensure the availability of a long-term development license	Nakhodkinskoye
Winner 2	Field located in a promising OGP, characterized by average performance indicators	Invest in the continued development in an attempt to influence the performance indicators	Tevlinsko-Russkinskoye, Vat-Eganskoye, Povhovskoye, Uzhno-Yagunskoye, Pokachevskoye, Kogalymskoye, Uryevskoye, Nong-Eganskoye, Druzhnoye, Nivagalskoye, Sredne-Khulymskoye, Severo-Pokachevskoye, Kamenny licensed block, Kechimovskoye
Question	Field located in a promising OGP, characterized by low performance indicators	Invest with a view to improve performance indicators, based on innovative technology of development, or, if this is not possible, look for ways to withdraw from the portfolio	-
Winner 3	Field located in a less attractive OGP, characterized by high performance indicators	Invest in the continued development with a view to maintain high performance indicators	Uzhno-Khylchuyuskoye, Pashorskoye, Pamyatno-Sasovskoye
Medium business	Field located in a less promising OGP, characterized by average performance indicators	Invest with caution, only if it is justified (promotes the growth of performance indicators)	Usinskoye, Vozeyskoe, Kharyaginskoye, Uzhno-Shapkinskoye, Tedinskoye, Kyrtalskoye, Unvinskoye
Loser 1	Field located in a less attractive OGP, characterized by low performance indicators	Invest only if it is justified, or look for ways to withdraw from the portfolio	-
Profit creator	Field located in a least promising oil and gas province (OGP), characterized by high performance indicators	Capitalize	-
Loser 2	Field located in a promising OGP, characterized by average performance indicators	Capitalize or withdraw	-
Loser 3	Field located in a least promising OGP, characterized by low performance indicators	Refrain from investments, look for ways to withdraw from the portfolio	-

OGP: Oil and gas province

Table 5: Indicators of success of the development of foreign projects

Criterion	Range of estimates				
	1 Low	2 Low/average	3 Average	4 Average/high	5 High
Density, API	>40.5	37-40.5	33.4-37.0	29.9-33.4	<29.9
Sulfur content, %	>1.39	1.27-1.39	1.15-1.27	1.03-1.15	<1.03
Proven oil reserves, mln. barrels	<93	93-104	104-114	114-125	>125
Proven gas reserves, bln. ft ³	<1331	1331-1488	1488-1644	1644-1801	>1801
Hydrocarbon reserves, mln. boe	<224	224-250	250-277	277-303	>303
Oil production, thous. tons	<697	697-779	779-861	861-943	>943
Production of marketable gas, mln. m ³	<964	964-1078	1078-1191	1191-1305	>1305
Production of marketable hydrocarbons, mln. boe	<8.16	8.16-9.12	9.12-10.08	10.08-11.04	>11.04
Operating oil wells, wells	<236	236-264	264-292	292-320	>320
Operating gas wells, wells	<27	27-30	30-33	33-36	>36
Company's share in the project, %	<52	47-52	52-58	58-63	>63
Duration of the agreement, last year	<2020	2020-2025	2025-2035	2035-2040	>2040

The choice of GE/McKinsey matrix as the main tool of portfolio analysis, subject to further modification, is justified. The complexity of building vertically integrated oil and gas holdings,

which calls for the transformation of traditional (classical) method tools of portfolio theory into the specifics of the operation of businesses at different stages of the process chain within the

Table 6: Indicators of the attractiveness of the region of project location

Criterion	Range of estimates				
	1 Low	2 Low/average	3 Average	4 Average/high	5 High
Development of the legal regulation of business, units	<1.8	1.8-2.55	2.55-3.45	3.45-4.2	>4.2
Compliance with property laws and rights, units	<1.8	1.8-2.55	2.55-3.45	3.45-4.2	>4.2
Aggregate tax rate, % of profits	>75.25	61.81-75.25	45.69-61.81	32.25-45.69	<32.25
Number of documents for registration for the commission of an export transaction, pcs	>11	9-11	7-9	5-7	<5
Number of documents for registration for the commission of an import transaction, pcs	>11	9-11	7-9	5-7	<5
Time required for export procedures, days	>77	63-77	47-63	33-47	<33
Time required for import procedures, days	>77	63-77	47-63	33-47	<33
Effectiveness of customs procedures, units	<2.1	2.1-2.98	2.98-4.03	4.03-4.9	>4.9
Export price, USD/container	>3437.7	2823.83-3437.7	2087.18-2823.83	1473.3-2087.18	<1473.3
Import price, USD/container	>4185.3	3437.92-4185.3	2541.08-3437.93	1793.7-2541.08	<1793.7
Assessment of financial policy, units	<1.8	1.8-2.55	2.55-3.45	3.45-4.2	>4.2
Environmental requirements, units	>4.2	3.45-4.2	2.55-3.45	1.8-2.55	<1.8
Quality of logistics services, units	<1.5	1.5-2.125	2.125-2.875	2.875-3.5	>3.5
Real interest rate, %	>31.50	25.88-31.50	19.13-25.88	13.50-19.13	<13.50
Foreign direct investment, % of GDP	<2.70	2.70-3.83	3.83-5.18	5.18-6.30	>6.30
Oil production per year, mln. tons	<30.40	30.40-43.07	43.07-58.27	58.27-70.93	>70.93
Gas production per year, bln. m ³	<30.20	30.20-42.78	42.78-57.88	57.88-70.47	>70.47
Workforce in the country, pers.	<7,679,144.6	7,679,144.6-10,878,788.1	10,878,788.1-14,718,360.4	14,718,360.4-17,918,003.9	>17,918,003.9
Urbanization level, %	<28.5	28.5-40.38	40.38-54.63	54.63-66.5	>66.5
Losses due to theft, vandalism, % of sales	4	3	2	1	0
Applications for patent in the country, pcs	<35	35-50	50-67	67-82	>82

GDP: Gross domestic product

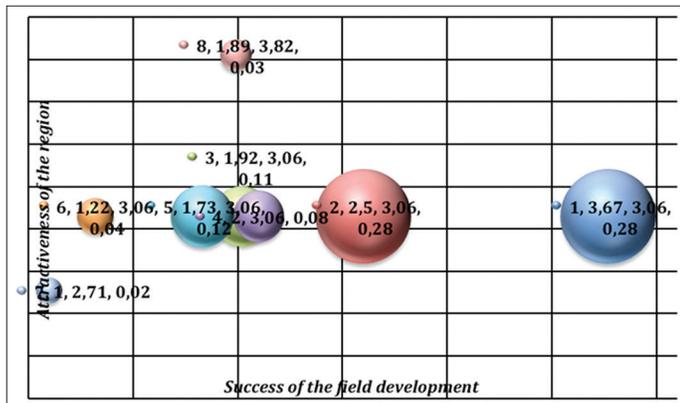
Table 7: Data for construction of the matrix on LUKOIL foreign fields (fragment)

Field	Field characteristic (X)	Region characteristic (Y)	Share in the company's foreign production (d)
Karachaganak	3.67	3.06	0.28
Kumkol	2.50	3.06	0.28
Tengiz	1.92	3.06	0.11
Severniye Buzachi	2.00	3.06	0.08
...

company, is specified. It is proposed to conduct portfolio analysis for the “production” direction of activity, using complex criteria characterizing the successful implementation of each project, as well as an indicator reflecting the attractiveness of the region of the project location. The sets of specific indicators separately for evaluation of foreign and domestic projects are suggested to assess these complex criteria. The threshold values are provided for each indicator on the basis of a comparative analysis, which allow to give an opinion on the level of the final integrated indicator (high, average or low). The proposed guidelines have been tested in the information array of projects implemented in the holding structure of JSC “LUKOIL.” It is recommended to use the integrated

Table 8: Recommendations for LUKOIL foreign projects

Quadrant	Field	Recommendation
Winner 2	WEEM	Invest in the continued development in an attempt to influence the performance indicators
Question	Meleiya	Invest with a view to improve performance indicators, based on innovative technology of development, or, if this is not possible, look for ways to withdraw from the portfolio
Winner 3	Karachaganak, Kandym-Khauzak-Shady	Invest in the continued development with a view to maintain high performance indicators
Medium business	Kumkol, Tengiz, Severniye Buzachi, Karakuduk, Ugo-Zapadny Gissar	Invest with caution, only if it is justified (promotes the growth of performance indicators)
Loser 1	Arman, Kazakhoil Aktobe, Shakh Deniz	Invest only if it is justified, or look for ways to withdraw from the portfolio

Figure 3: Portfolio of JSC “LUKOIL” fields abroad

- (1) Karachaganak, (2) Kumkol, (3) Tengiz, (4) Severniye Buzachi, (5) Karakuduk, (6) Kazakhoil Aktobe, (7) ShakhDeniz, (8) WEEM

performance indicators of the competitiveness and attractiveness of the regions of projects implementation as coordinates of the position of business units in the matrix. It is also recommended to use the circles whose diameter is selected proportionally to the share of production for the project in total corporate volume of hydrocarbon production to display each project in the matrix. The portfolio matrix is built that allowed to determine the location of each project (business unit) in the total corporate portfolio and to give advice on building an investment strategy. At the same time, recommendations are given to take a balanced approach to solving strategic issues, particularly in relation to business units recommended for liquidation following the analysis results.

4. DISCUSSION

Portfolio analysis is seen in the writings of many domestic and foreign researchers (Vesnina, 2014; Ansoff, 1989; Daft, 2012; McKean, 2010). Currently, it is an integral part of the strategic analysis. There is a wide range of tools that allow to evaluate the corporate portfolio of the organization from different angles, using various evaluation indicators for different purposes (Vikhansky, 2011; Grushenko, 2014; Khorin and Kerimov, 2012; Rumelt, 2014). At the same time, as a rule, versatile tools are offered (Zaitsev and Sokolova, 2014; Kerzner, 2014; Lyasko, 2013; Stern and Stalk, 2012), which, however, are difficult to apply in cases where the company is very specific. For example, the integrated oil and gas companies are compound vertical and horizontal structures. Accordingly, the corporate portfolio in such companies

is multifaceted, and portfolio analysis requires prior modification of methodological tools for this purpose.

In this paper, the author proposes a transformed methodological procedure and its approbation. The analysis is based mainly on retrospective information, which may hinder the process of formulating recommendations for the long-term composition of the portfolio. However, the use of reliable and comprehensive forecast information may increase the practical relevance of the proposed methodological approach, making it useful in the design of the portfolio of business units in the future.

5. CONCLUSION

In conclusion, it should be noted that the goal of this study, which was to develop a methodological basis of the analysis of the corporate portfolio of the oil and gas enterprise, has been achieved. The modified tools, which can be used in the practice of industrial enterprises for optimization of the corporate portfolio, have been obtained on the basis of a serious study of the theoretical and methodological issues in the field of portfolio analysis and projecting of the peculiarities of the oil and gas company on these bases. Using a significant information array on domestic and foreign projects implemented by the company, the author's recommendations have been tested, which proved the feasibility of using these proposals.

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