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Analytical Justification of Investment Project "Fish-breeding Sturgeon Complex"

Danyliv M.M.
Voronezh State University of Engineering Technologies, 19, Revolution Prospekt, Voronezh, 394036, Russia

Frolova V.P.
Voronezh State University of Engineering Technologies, 19, Revolution Prospekt, Voronezh, 394036, Russia

Vasilenko O.A.
Voronezh State Agricultural University named after Emperor Peter I, 1, Michurina St., Voronezh, 394087, Russia

***Abstract*—The article is devoted to the analytical justification of the investment project "Fish-Breeding sturgeon complex". The project deals with the development of some caviar products, including Sterlet, Russian sturgeon, and Bester black caviar as well as some commercial fish products such as frozen, chilled, cold and hot smoked and dried fish. The concept of business implies cluster technology i.e. a closed cycle of different industries aimed at one ultimate goal achievement on the base of vertical integration. Assessment of the investment project efficiency was carried out using the main indicators: NPV, IRR, PBP, as well as the project cumulative investment. To assess potential risk danger, it was applied the sensitivity analysis of these indicators related to the necessary parameters. It has been developed the financial model of the investment project and proved this project attractiveness. The main indicators of the investment project effectiveness include payback period and the ratio of the budget revenues to the amount of payments from the budget.**

***Keywords*—investments, indicators, enterprise, investment project, calculation, efficiency assessment, investment risks, fish-breeding sturgeon complex.**

I. Introduction

Aquaculture cultivation of sturgeon species is gaining popularity all over the world and the Russian Federation is not an exception. The main purpose of breeding and growing sturgeon is to obtain black caviar, known as a high-value delicacy. The main problems of the black caviar market development are connected with a significant share of poaching caviar, which is up to 20 tons per year, while the volume of legal caviar is about 40 tons per year [1].

The main producers of sturgeon caviar in the Russian Federation are LLC "Fish Firm "Diana" ("Russian caviar house"), LLC "Beluga" and some others. World production of black caviar is increasing, the main share being accounted for by the Chinese manufacturers (40 tons per year). According to the forecasting they are planning to increase their production up to 300 tons by 2020. Iran and the US are going to produce about 100 tons and Israel – 6.5 tons.

II. Research Rationale

The project deals with the development of some caviar products, including Sterlet, Russian sturgeon, and Bester black caviar as well as some commercial fish products such as frozen, chilled, cold and hot smoked and dried fish. At the same time the project concerns the enlargement of the assortment, so it is offered collagen products of medical and cosmetic purposes as a promising ones [2, 3]. The first production lot is planned in 6 years after the launching of the project. The full production cycle will start in 10 years. Assessment of the investment project efficiency was carried out using the main indicators: NPV, IRR, PBP, as well as the project cumulative investment. To assess potential risk danger, it was applied the sensitivity analysis of these indicators related to the necessary parameters [4, 5].

III. Problem Statement

The problem of the research is connected with the situation of uncertainty. According to the Russian Federal Fishery Agency the volume of commercial aquaculture production is steadily growing and it has been amounted to 96 thousand tons from January to September in 2017, which exceeds the figures for the same period of the previous year by almost 40%. Moreover, it has been arranged 1.7 thousand fishing area with a total area of 100 thousand hectares since mid-2016. But, in spite of this fact the manufacture of the finished products is not always ensured.

IV. Materials and Techniques

To assess the investment project efficiency it was used dynamic criteria that reflect the most modern approaches to the investment effectiveness assessment: NPV (Net Present Value); IRR (Internal Rate of Return); PBP (Payback Period); PI (Profitability Index). It was also used qualitative and quantitative methods of research, as well as such information sources as open data of state organizations and commercial enterprises; regulatory and legal framework of the Russian Federation, calculated financial models, open information of mass media, etc.[4, 5].

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V. RESULTS

When developing an investment project, we determine the clustering principles of Voronezh region, which include: competitiveness, reindustrialization, education, diversification, environmentalization.

Vertically integrated approach of the "Aquaculture" cluster implementation includes the following directions: fish growing on the base of closed cycle in the closed water supply installation; feed production; fish primary processing; fish deep processing; low-temperature transport and warehouse logistics; food distribution [6, 7].

The investment project capacity of the main product is up to 250 tons of commercial fish per year and up to 5 tons of food caviar products per year. General scheme of the fish-breeding sturgeon complex assortment is shown in figure 1.

The most common types of sturgeon species are Russian sturgeon, beluga, bester and sterlet.

Financial and economic assessment of the investment project "Fish-breeding sturgeon complex" has been conducted on the base of the Microsoft Office package, in particular the MS Excel package. Calculations have been made in constant prices of the current year without adjustment for inflation for the time exceeding the project payback period.

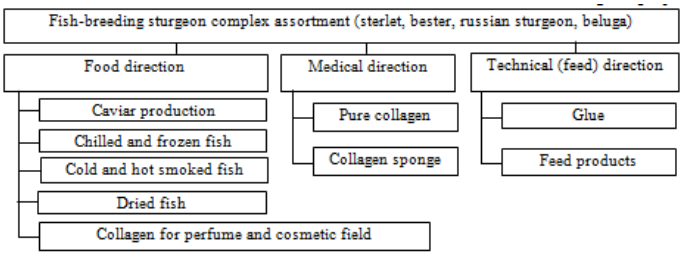

Fig.1. Scheme of the fish-breeding sturgeon complex assortment.

Capital investments include construction of fish processing workshops and auxiliary units, electrical fitting works, construction of access ways and purchase of basic technological equipment. Budgeted balance sheet (tab. 1) shows that the capital structure will consist of 60% of noncurrent assets and 40% of current ones as at the 4th quarter of 2026 (the end of the project investment period and equipment introduction).

TABLE I. BUDGETED BALANCE SHEET

Balance	**1 кв./2017**	**2 кв./2017**	**-**	**3 кв./2026**	**4 кв./2026**
Monetary means	412 951 390	376 044 105		543 507 104	591 428 929
Debtors				71 666 667	71 666 667
Stocks					-1 320 904
Other current assets	1 343 943	2 691 731			
Total current assets	414 295 334	378 735 836		615 173 771	661 774 692
Capital assets	14 877 914	29 332 961		77 689 033	76 836 490
buildings and structures	10 725 517	21 279 423		25 622 982	24 936 541
equipment	3 593 347	7 174 238		42 990 351	42 824 249
office	238 800	238 800		238 800	238 800
machines					
other capital assets	320 250	640 500		8 836 900	8 836 900
Other assets					
Total non-current assets	14 877 914	29 332 961		77 689 033	76 836 490
Total assets	429 173 248	408 068 797		692 862 803	738 611 182
Long-term obligations	350 000 000	350 000 000			
Statutory capital	100 000 000	100 000 000		100 000 000	100 000 000
Reserves and funds					
Retained profit (negative profit)	-20 826 752	-41 931 203		580 362 803	638 611 182
Total capital	79 173 248	58 068 797		680 362 803	738 611 182
Total obligations and capital	429 173 248	408 068 797		692 862 803	738 611 182

Further, the structure of the project is shifting towards current assets and the share of current assets will have been about 70% by the end of 2026 because of some facts, namely: incurring of the current debit debt, production stocks, as well as the accumulated retained profit in the form of monetary means. Available cash will be placed either on the bank deposit to generate extra income, or advanced in raw materials in the season to obtain more stable price. For the economic assessment of the project effectiveness, it was calculated business value, financial indicators, net flow, net present value, internal rate of return and payback period (table. 2-3).

TABLE II. BUSINESS VALUE ASSESSMENT

Business value assessment		
Assessment is done related to WACC =	14%	
Assessment by discounted cash flow method on the base of:		
net cash flow (NCF)	110 697 012	rub.
net profit	225 017 168	rub.
earnings before interest and taxes (EBIT)	514 540 908	rub.
Earnings before Interest, Taxation, Depreciation & Amortisation (EBITDA)	531 617 384	rub.
dividends	103 434 790	rub.
dividends + disposal value	302 670 688	rub.
dividends + continuing value	247 257 947	rub.

TABLE III. FINANCIAL INDICATORS OF THE PROJECT

Financial indicators	**1 кв./2017**	**2 кв./2017**	**-**	**3 кв./2026**	**4 кв./2026**
Net working capital	414 295 334	378 735 836		602 673 771	661 774 692
Leverage ratio	0.18	0.14		0.98	1.00
Total liabilities to total assests	0.82	0.86		0.02	0.00
Long-term liabilities to assets	0.82	0.86		0.00	0.00
Total liabilities to own capital	4.42	6.03		0.02	0.00

Table continuation

Long-term liabilities to noncurrent assests	23.52	11.93		0.00	0.00
Interest coverage ratio	-0.18	-0.18		156.69	-
Margin on sales	-	-		71.8%	72.2%
Return of equity	-105.2%	-145.4%		45.4%	42.1%
Return on current assets	-20.1%	-22.3%		50.2%	46.9%
Return on noncurrent assets	-559.9%	-287.8%		397.3%	404.3%
Return on investments	-19.4%	-20.7%		45.4%	42.1%
Net cash flow	-37 048 610	-36 907 286		79 334 541	79 837 951
Discounted net cash flow	-35854668	-34566841		22112622	21535804
Payback (discounted net cash flow)	-35854668	-70421509		89161208	110697012

The main indicators of the project investment attractiveness are as follows: funding volume is 350 000 thousand rubles; net present value: NPV is 110 697 012 rubles; internal rate of return: IRR is 20 %; payback period: PBP is 105 months. Budget efficiency of the project is of great importance; it has been analyzed in relation to the budget discount of the 14 % per year (table. 4).

TABLE IV. BUDGET EFFICIENCY OF THE PROJECT

Fiscal revenue	**1 кв./2017**	**2 кв./2017**	**...**	**3 кв./2026**	**4 кв./2026**
Profit tax				19 290 274	19 416 126
Value-added tax				19 198 018	19 198 018
Property tax	74 390	146 665		388 445	384 182
Turnover tax					
social contributions	687 654	687 654		1 416 380	1 416 380
Total tax revenue	762 044	834 319		40 293 117	40 414 707
Disconted tax revenue	737 486	781 411		11 230 751	10 901 623

The business model of the project has high indicators of investment attractiveness, which help to attract resources of the borrowings market. To assess the risks of the project, it has been analyzed the sensitivity of NPV and Cash-flow indicators related to the parameters of sales decrease, sales price decline and direct production costs increase (table 5).

TABLE V. NPV DEPENDENCE ON INDICATORS DEVIATIONS

NPV dependence on indicators deviations	**5%**	**15%**	**25%**	**35%**
Sales decrease	83 307 472	28 528 392	-26 396 125	-81 481 687
Decline in price of products/services	81 695 212	23 691 612	-34 509 334	-92 894 918
Direct costs increase	110 050 130	108 756 364	107 462 598	106 168 832
Constant costs increase	110 434 289	109 908 843	109 383 396	108 857 950
Capital cost increase	105 549 714	95 255 118	84 960 522	74 660 416
Interest rate increase	97 099 377	69 904 107	42 708 836	15 472 932
Minimum account size	5%	15%	25%	35%
Sales decrease	28 463 750	10 462 956	-2 735 356	-23 756 926
Decline in price of products/services	27 738 163	8 286 196	-6 727 442	-31 121 001
Direct costs increase	37 143 805	36 503 123	35 862 440	35 221 758
Constant costs increase	37 367 531	37 174 300	36 981 068	36 787 837
Capital cost increase	31 721 729	20 236 893	8 752 058	6 325 179
Interest rate increase	22 107 896	-1 312 795	-27 731 867	-59 008 687

Sensitivity analysis shows that this project is quite resistant to fluctuations of sales and direct costs in relation to NPV. The indicator is more sensitive to the decline in prices of finished products, so if the price fluctuates by more than 10%, it is necessary to revise other indicators of the financial model in order not to get a negative NPV. It is also important to foresee some sources of insufficient funds coverage, if direct costs will increase by more than 5 per cent.

SWOT analysis is a description of the company's strengths and weaknesses, its market opportunities and assumed threats (tab. 6).

TABLE VI. SWOT ANALYSIS

Strengths	**Weaknesses**
The production cycle is carried out in the accelerated way (application of the closed water supply installations), if cage culture fishery method is not used	Inability to provide product discounts in the presence of the black market (production profitability decrease)
The price of the products is quite competitive (using modern achievements in the field of sturgeon breeding, attracting the best specialists)	The initial stage requires the technological processes development
Legal production, product compliance to regulatory documentation requirements (absence on the black market)	High dependence degree of production costs on tariffs for energy supply, water supply, gas
Recruitment of highly qualified personnel	
Support of the project by local authorities (administration)	
Opportunities	Threats
Conclusion of long-term contracts with large retail chains (production is certified and legal)	High competition related to implementation of similar investment projects
Application of modern scientific achievements in the technological process	Working capital deficiency
Opportunities for employees training	Deadtime on different stages of the technological process due to the lack of experience
Export of products to the EU, USA, etc.	Sanctions policy blocks the distribution channels
Flexible pricing policy based on improved technology and productivity	
Geographic growth and new sales methods development	

Taking into account the risks described above, it's impossible to develop production capacity in accordance with the business plan approved for the following reasons: capital costs increase does not allow a company to put in the project budget the production sites planned; failure of production launch term has a negative impact on the payback and profitability of the project; operational risks have a high probability, which can lead to the project operating profit decrease.

The risks considered negatively affect the indicators of the project investment attractiveness on the stage of its implementation.

VI. CONCLUSIONS

As a result of the financial model calculation with above-mentioned risks consideration, it has been obtained extremely poor indicators of the investment attractiveness of the project (negative NPV, payback period is of more than 15 years, IRR is less than 10%). To assess the risks of the project, it has been analyzed the sensitivity of NPV and Cash-flow indicators related to the parameters of sales decrease, sales price decline and direct production costs increase. It should be noted that when developing such large-scale investment projects with the participation of a large number of specialists involved, it is necessary to be as flexible as possible to operation mode related to the current situation of the project itself and the external environment as well.

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