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Promising Directions of Technological Transformation of Northern Reindeer Husbandry in Russia

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Abstract. The prolonged decline in northern reindeer husbandry is reflected in a reduction of the number of reindeer and the low economic efficiency of the sector. State support for reindeer farms, provided in the form of compensation for up to 95% of operational costs, ensures only the maintenance of current activities, without creating conditions for the development and modernization of production. This practice dates back to Soviet times and has been going on for many decades. In this regard, it is necessary to apply radically new approaches to the organization of production activities. The article presents an analysis of promising areas of technological transformation of the sector, including transition to fenced pasturing, introduction of deep processing of products, and creation of high value-added products. Technological transformation requires significant investments. Will it be possible to cover these costs in the foreseeable future? To answer this question, the article presents the results of a study using the example of a pilot investment project that is planned to be implemented in the Chukotka Autonomous Okrug. The analysis of the project aims to identify the conditions that could ensure its financial viability and economic efficiency. This has resulted in the formation and testing of a methodological approach to evaluating the prospects of such projects, based on previously conducted research. The developed recommendations on the industry's self-financing and increasing its competitiveness can be widely used to create favorable conditions for the sector to overcome the crisis and for sustainable development of the Arctic regions.

Keywords: *Arctic Zone of Russia, northern reindeer husbandry, technological transformation, economic effect, investment project, state support*

Introduction

Russia is the world leader in terms of reindeer population (accounting for 68% of the global livestock). According to recent studies¹, the average annual decline in the reindeer population in the Russian Arctic zone, where almost 90% of the country's total livestock is concentrated, is approximately 2.5%.

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¹ Arguments of the Week. URL: <https://argumenti.ru/society/nature/2022/06/776201> (accessed 12 April 2025).

According to official statistics², the unprofitability rate of domestic reindeer farming was 51.73% in 2022 and 52.36% in 2023. Reindeer herding in Russia is experiencing a difficult period, characterized by prolonged stagnation. During the early stages of establishment and development of reindeer husbandry, production indicators were strongly impacted by harsh natural and climatic conditions. These included a lack of forage, hypothermia among young reindeer, and increased risks of attack by predators (wolves, bears, lynx, and arctic foxes) and birds. Newborn calves were particularly vulnerable, falling prey to arctic foxes and birds during the calving period, which directly reduced the survival rate of young reindeer (Bryzgalov, 2022). The relevance of this issue is determined not only by economic losses, which represent a serious problem, but also by the significant social role of reindeer husbandry in the North, which forms the basis for the well-being and preservation of the traditional way of life of the indigenous peoples. State support for reindeer herding farms, provided in the form of compensation for up to 95% of operational costs, ensures only the maintenance of current activities, without creating conditions for the development and modernization of production. This practice dates back to Soviet times and has been going on for many decades.

According to experts, the trends towards decline of northern reindeer husbandry, which emerged in the late 1980s and early 1990s, are irreversible unless radical measures are taken to promote the technological and economic development of the sector. Existing methods of state support and traditional management practices do not ensure the sustainable development of reindeer herding in Russia. It is necessary to explore the possibilities for technological transformation and to identify effective approaches to modernizing the industry that can ensure its self-financing, increased competitiveness, and sustainable development of Arctic territories (Dayanova, Egorova, Protopopova et al., 2020; Ginter, Kuzmin, 2020).

Significant transformation of the industry is possible through the introduction of innovative methods of animal husbandry and grazing, as well as the development of processing infrastructure focused on the production of high value-added reindeer products and the minimization of wastes. The study aims to develop a methodological approach for assessing the effectiveness of technological transformation in the reindeer herding industry, as well as to test the proposed tools using a pilot project in the “Omolonskaya Tundra” area of the Chukotka Autonomous Okrug. In addition to developing reindeer husbandry, this project has the objective of establishing facilities for the primary and advanced processing of reindeer husbandry products, as well as creating a favorable environment for the sustainable and comprehensive development of the region’s rural economy and infrastructure. The project is expected to improve the quality of life and well-being of the local population, with a particular emphasis on the indigenous peoples of the North living in this area. The authors believe that if the pilot project is successful, similar technologies could be widely adopted across Russia’s northern territories (Koshelev, Romanyuk, Sukharnikova et al., 2024).

² The level of profitability (loss) of sold goods, products, works, services since 2017. URL: <https://www.fedstat.ru/indicator/58036> (accessed 12 April 2025).

This article is a continuation of research into the technological transformation of northern reindeer husbandry. The main objective of this study is to conduct an additional analysis focused on identifying and assessing promising areas for the technological transformation of reindeer herding in Russia, thereby complementing and expanding on previously obtained results.

This study aims to identify and evaluate prospective directions for the technological modernization of reindeer husbandry in Russia. Particular attention is paid to the analysis of an investment project that envisages a transition from traditional grazing methods to fenced husbandry in the Arctic zone, as well as the introduction of modern technologies for primary and advanced processing of reindeer products. The goal of the study is to substantiate the potential of the proposed technological innovations for ensuring sustainable development of the industry, increasing its competitiveness, and improving the socio-economic situation in the Arctic regions.

Research methods

The technological transformation of reindeer herding in the north requires significant investments. World Bank and UNIDO methodologies are used in international practice to analyze investment projects (Brown, 1980; Belli, Anderson, Barnum et al., 1998; Gittinger, 1982). However, the project under study has a number of specific features that require adaptation of the methodology. The limited financial resources of reindeer herding enterprises, due to low incomes and a lack of available funds, call into question the appropriateness of taking the alternative cost of capital into account when evaluating investment projects. The lack of real opportunities to invest in alternative areas of activity determines the absence of potential lost profits. In such circumstances, when analyzing the project's cash flows, it is reasonable to disregard discounting, as the discount rate, equal to the alternative cost of capital, approaches zero. In this case, the project's profitability is determined on the basis of nominal cash flows at constant prices.

At the same time, a shortage of own funds and limited opportunities to obtain external capital lead to the need for significant state financial assistance, particularly at the initial stage of the investment project's implementation.

Another peculiarity of applying this methodology is related to the specific consideration of the "Without Project" scenario, which assumes that the project is abandoned and traditional reindeer herding practices continue to be used. The traditional and generally accepted method for evaluating projects is based on a comparison of the "With Project" and "Without Project" scenarios, with the project's cash flows being determined by the difference between the cash flows in these scenarios. When evaluating projects related to the development of northern reindeer herding, this approach is modified to some extent. In particular, maintaining the old technology (the "Without Project" scenario) does not offer the industry a chance of recovering from the crisis, and the cash flows will be negative. Subtracting these negative values from the cash flows in the "With Project" scenario will result in an even higher assessment of the project's effectiveness. In other words, the worse the "Without Project" scenario, the higher the estimated benefit of implement-

ing the project. However, according to the methodology, this is precisely how a project's effectiveness should be assessed. At the same time, it is essential to remember the importance of competent and scientifically justified forecasting of development not only for the "With Project" scenario, but also for the "Without Project" scenario throughout the entire projection period, as the accuracy of the project assessment itself depends on this.

In addition to effectiveness, the financial feasibility of the project should also be assessed. If the project cannot be implemented due to a lack of financial resources at any given point in time, then assessing its effectiveness is irrelevant. Feasibility depends on the availability of sufficient internal and/or attracted financial resources throughout the calculation period to cover operating and investment costs. Moreover, these should be financially accessible resources: previously accumulated, borrowed funds, funds received as state support or in the form of sponsorship, grants, etc., as well as those generated by the project itself. Due to the obvious economic inefficiency of traditional reindeer herding technology and the lack of reindeer herders' own funds, they are practically unable to accumulate any capital or to obtain and service a commercial loan. Since the "Without Project" scenario is purely hypothetical ("what will happen if the project is abandoned"), the cash flows here are conditional, one might say virtual, and it will not be possible to finance the project using these flows. Therefore, to assess the financial viability of the project, the cash flows in the "With Project" scenario are used, as they reflect the real net benefits (revenues minus costs) in monetary terms. The financial feasibility of the project is assessed on the basis of a positive net cash flow at every stage of the projection period. This means that revenues from all sources should exceed total costs, including both operating and capital expenditures.

The project comprises three components: 1) the transition of reindeer husbandry to fenced grazing; 2) the construction of a slaughterhouse and a primary processing facility; 3) the implementation of deep processing technology. These components are relatively independent and can be implemented either separately or sequentially over time. In particular, it is possible to transform the reindeer herding industry to fenced husbandry without creating slaughter and processing facilities, while maintaining the traditional practice of selling live raised reindeer to harvesters. Alternatively, it is possible to postpone the construction of fencing, but to establish facilities for the primary and advanced processing of products obtained from the existing herd, taking into account its potential for extensive growth.

As the authors have already assessed each of these components (Koshelev, Romanyuk, Sukharnikova et al., 2024), this article focuses on analyzing the project as a whole and evaluating its financial feasibility and effectiveness, as well as justifying measures of state support for the sector's technological transformation. The cash flows take into account investments in the construction and equipment of a "smart" fence, a slaughterhouse, and facilities for deep processing of products, as well as ongoing costs for the maintenance, grazing, and slaughter of animals, and for processing and manufacturing of finished products. Revenues are generated from the sale of high value-added, deeply processed products. When calculating the cash flows, constant prices are

used, based on the average prices prevailing in 2024. Inflation is disregarded, as all cash flows are adjusted to a single point in time — the start of the first year of the project's implementation. In other words, all calculated values of the integral indicators used to assess the investment project's effectiveness are adjusted to the "zero" point in time.

Research results and discussion

In accordance with the methodological approach outlined above, research and calculations were conducted in the following areas:

- analysis and forecasting of the "Without Project" scenario;
- analysis and forecasting of the "With Project" scenario;
- assessment of the project's financial viability;
- assessment of the project's economic efficiency.

1. "Without Project" scenario

As already noted, the quality of the assessment of the "Without Project" scenario directly influences the validity of the evaluation of the project's own effectiveness, since all integral indicators (NPV — Net Present Value, IRR — Internal Rate of Return, etc.) are calculated on the basis of incremental cash flows, that is, flows equal to the difference between the "With Project" and "Without Project" cash flows.

The "Without Project" scenario assumes that the project initiator, the Orbat Agricultural Production Cooperative (Omolon village, Bilibinskiy District, Chukotka Autonomous Okrug), refuses to implement the project to introduce new reindeer grazing, slaughter and product processing technologies. In this case, the project initiator will continue to use traditional grazing techniques and sell live reindeer to the harvester. The initial herd size (at time zero, i.e., at the start of the project) is 250 head (200 females and 50 males). There are no plans to purchase breeding stock from external sources, and changes in herd size will be achieved through the reproduction of the herd's own stock. For example, during the first year of the project period, 160 calves (80 females and 80 males) will be added to the initial herd size, taking into account the birth rate of one calf per adult female and a survival rate of 80% (Fig. 1).

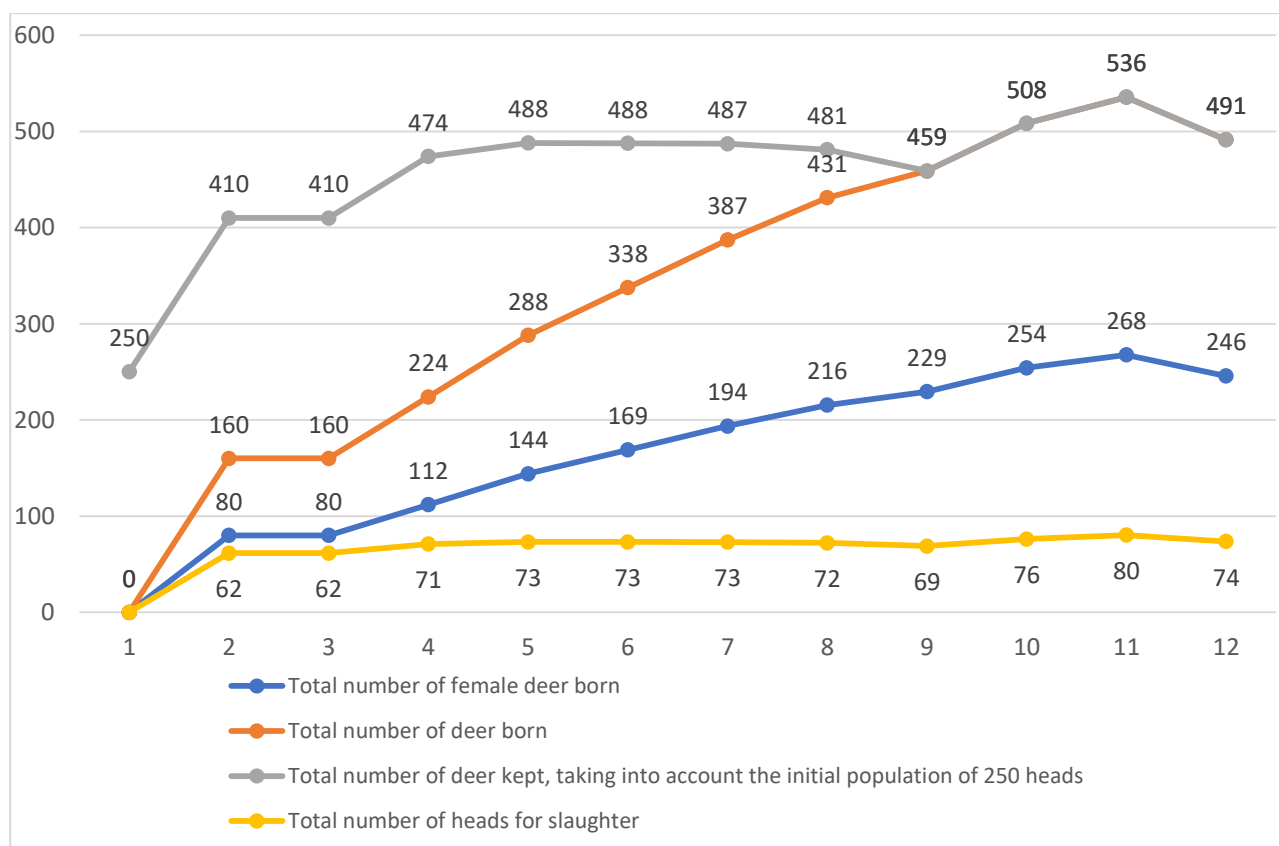


Fig. 1. Reindeer population dynamics in “Without Project” scenario³, heads

As newly born females reach reproductive age (1.5 years) and are transferred to the heifer age group, they begin to produce calves (at around 3 years of age) and gradually replace the initial herd of adult females after their reproductive performance declines. Thus, by the 8th year, the entire initial population of females will be replaced by newly born females within the estimated period. As can be seen, under these conditions, traditional technology does not allow for sustainable, expanded herd reproduction, resulting in virtually no positive dynamics in sales of reindeer to the slaughterhouse operator.

Obviously, this “Without Project” scenario has a direct impact on revenue generation from deer sales and cash flows (Table 1). Cost items include not only operational expenses (wages of reindeer herders and management personnel, transportation costs, wolf hunting, etc.), but also the purchase and restoration of fixed assets with a limited service life (snowmobiles, radio stations, corrals, satellite phones, etc.). Negative net benefits (the difference between revenue and total costs) confirm the inefficiency of traditional technology, and the farm’s production should be sustained through state subsidies, which in recent decades have amounted to 95% of annual costs.

³ Source: compiled by the authors according to data provided by the project initiator.

Table 1

Cash flows in “Without Project” scenario⁴, thousands rubles

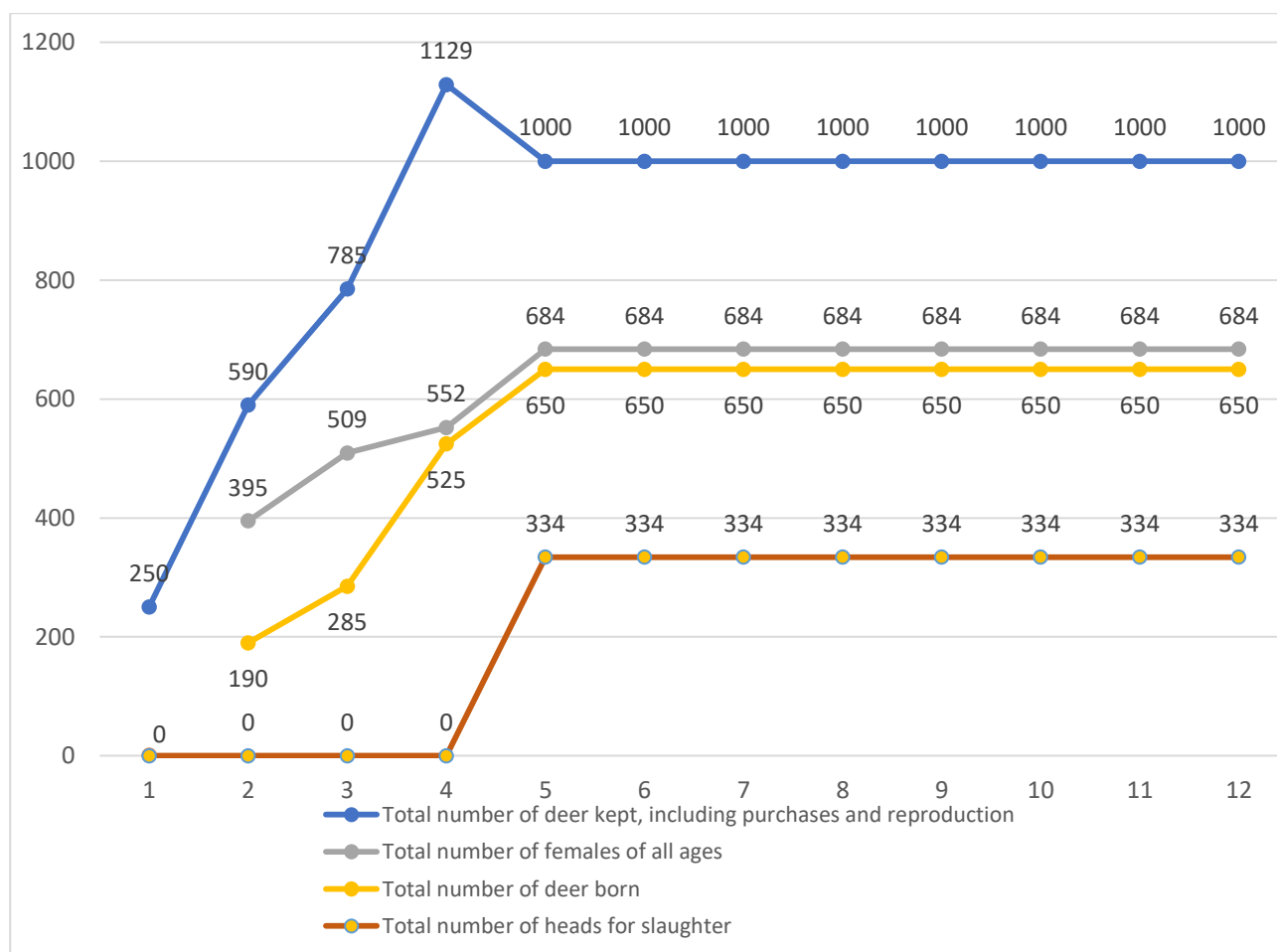
Indicators	Years of the calculation period							
	1	2	3	4	5	...	10	11
Costs								
Fixed assets	2 890	50	60	80	240	...	80	0
Protective equipment	245	245	283	291	291	...	320	293
Transport costs	218	218	218	218	218	...	218	218
Labour costs	3 162	3 162	3 162	3 162	3 162	...	3 162	3 162
Workwear	216	342	221	342	216	...	342	216
Authorized equipment	282	185	245	109	246	...	109	246
Wolf hunting	54	54	54	54	54	...	54	54
Production management	220	220	220	220	220	...	220	220
Total costs	7 286	4 476	4 463	4 475	4 646	...	4 504	4 409
Benefits								
Revenue from reindeer sales	1 230	1 230	1 422	1 464	1 463	...	1 607	1 474
Net benefits	-6 056	-3 246	-3 041	-3 011	-3 184	...	-2 897	-2 935
Cumulative net benefits	-6 056	-9 302	-12 343	-15 354	-18 538	...	-33 985	-3 6920

2. “With Project” scenario

The project involves the construction and installation of a “smart” fence with a total length of 180 km, with the phased commissioning of four sectors of 25,000 hectares each over the first four years. The reindeer herd will begin to be housed within the fence by the end of the first year following the commissioning of the first sector. The project assumes an increase in the reindeer population through both natural reproduction and the purchase of breeding animals (females and males) during the first four years. This will enable the herd to reach the planned size of 1,000 head, corresponding to the fence’s carrying capacity (see Fig. 2). The calculation of the target population size is based on the standard grazing load in the forest-tundra zone, which is 100 hectares per animal.

When calculating population growth and dynamics, it is assumed that females begin reproducing on average at the age of three and maintain reproductive function for eight years. The transition to fenced grazing will increase the survival rate of reindeer to 95%, compared to 80% with traditional grazing (Yuzhakov, Zuyev, Elsakov et al., 2023). Until the project reaches full capacity — namely, until the completion of the fence construction, the achievement of the planned herd size of 1,000 head, and the commissioning of processing facilities — no industrial slaughter of reindeer will take place.

⁴ Source: compiled by the authors based on annual reports and primary documentation from reindeer husbandry enterprises.

Fig. 2. Reindeer population dynamics in "With Project" scenario⁵, heads

All major investments are planned for the first four years of the project. While investments for fence construction and breeding herd formation are allocated for all four years, the slaughterhouse and deep processing plant should be built and equipped before the herd is fully formed and slaughtering begins, i.e., in the third year of the project (Table 2). Therefore, the greatest investment burden falls on the third year of the project.

Table 2

Investment costs in "With Project" scenario⁶, thousands rubles

	Years of the calculation period			
	1	2	3	4
A. Reindeer husbandry				
Fence construction	27 000	21 000	21 000	12 000
Equipment (including delivery)	12 600	10 000	15 000	20 000
Installation work	4 500			
Software development	9 535			
Transport vehicles	2 400			
Purchase of breeding stock	5 000	7 857	9 429	11 000
Total investment in reindeer husbandry	61 035	38 857	45 429	43 000
B. Slaughterhouse				
Mini-slaughterhouse			23 590	
By-products processing plant			22 580	

⁵ Source: compiled by the authors.

⁶ Source: compiled by the authors according to commercial proposals from companies — potential suppliers and contractors.

Transportation to the project site			7 200	
Total investment in slaughtering			53 370	
C. Deep-processing plant				
Turnkey plant			30 000	
Transportation to the project site			3 600	
Total investment in deep processing			33 600	
Total investment	61 035	38 857	132 399	43 000

The total volume of capital investment amounts to 275.3 million rubles, of which 132.4 million rubles, or almost half of the total project investment, are allocated to the third year. The structure of investment costs by project components (Fig. 3) indicates that expenditure on the introduction of fenced grazing technology dominates — 188.3 million rubles, or 68.4%.

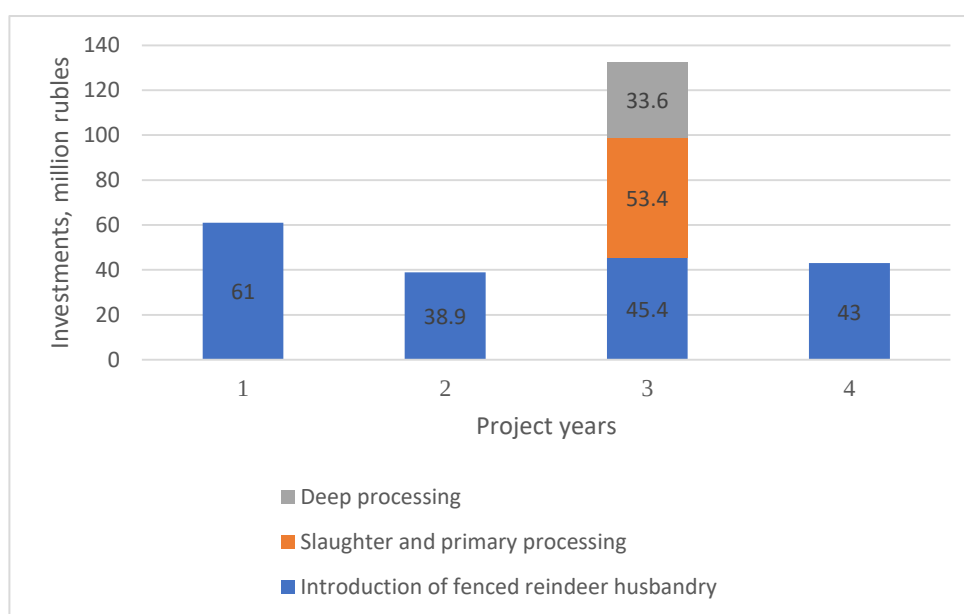


Fig. 3. Structure of investments⁷, million rubles

The transition to the new fenced grazing technology will result in some changes in operational costs for the reindeer herding component, including increased herd size within the fence, reduced labor costs for grazing, and the absence of the need to shoot wolves within the fence (Table 3). Operating costs for fenced husbandry were estimated on the basis of a standard process flow chart (Dayanova, Egorova, Protopopova et al., 2017), taking into account the specific characteristics and differences in the technological processes involved in fenced and traditional husbandry. From the fourth year onwards, the total project operational costs include expenses associated with the operation of the slaughterhouse and the deep-processing plant after their commissioning.

⁷ Source: compiled by the authors.

Table 3

Operational costs in "With Project" scenario⁸, thousands rubles

	Years of the calculation period						
	1	2	3	4	5	...	11
A. Operational costs in reindeer husbandry							
Protective equipment	454	793	1240	770	770	770	770
Transport costs	218	218	218	218	218	218	218
Labour costs	2 428	2 428	2 428	2 428	2 428	2 428	2 428
Workwear	216	342	221	342	216	347	216
Authorized equipment	149	152	147	92	146	148	146
Wolf hunting	54	54	0	0	0	0	0
Production management	220	220	220	220	220	220	220
Total	3 739	4 207	4 475	4 070	3 998	4 132	3 998
B. Operational costs in the slaughterhouse							
Labour costs	0	0	0	3 744	3 744	3 744	3 744
Electricity and water supply	0	0	0	237	237	237	237
Total	0	0	0	3 981	3 981	3 981	3 981
C. Operational costs for deep processing							
Labour costs	0	0	0	389	389	389	389
Electricity and water supply	0	0	0	341	341	341	341
Raw materials and supplies	0	0	0	181	181	181	181
Total	0	0	0	911	911	911	911
Total operational costs	3 739	4 207	4 475	8 963	8 891	9 025	8 891

The most popular and in-demand types of finished products on the market have been selected as the project's end products (Table 4). To avoid double-counting, the cost of the main raw material — meat — was excluded from the production cost, as meat production costs are already included in the costs of reindeer rearing, slaughtering, and primary processing. Constant (average actual prices for 2024) small-scale wholesale prices were used to determine revenue from product sales. The products with the highest profit margins are loin, ham and dry-cured sausage. They account for over 93% of all revenue from the sale of deep-processed products. Revenues from the sale of by-products (tongue, heart, liver, head, blood) and other products (skins, horns) are added to the revenue from the sale of finished meat products (Dayanova, Egorova, Protopopova et al., 2017; Mukhachev, Kolpashchikov, Layshev, 2001).

Table 4

Calculation of production costs and revenue by product type⁹

Types of finished products	Total raw material consumption, t	Production output, t	Cost price per ton (excl. meat costs), thous. rub	Total costs (excl. meat costs), thous. rub	Selling price, thous. rub/t	Revenue, thous. rub
Neck cut	0.33	0.33	8.5	3.7	1200	391.2
Loin	7.68	5.76	33.2	253.9	1 620	9 328.9
Ham	6.95	5.22	34.0	235.0	1 260	6 571.4
Dry-cured sausage	2.66	3.55	77.0	362.8	1 700	6 032.2
Shoulder	1.41	0.92	40.3	49.1	900	826.2
Shank	0.27	0.27	8.5	3.0	500	132.6
Knuckle	0.34	0.34	8.5	3.8	500	170.8
Total	X	16.37	X	911.3	X	23 453.3

⁸ Source: compiled by the authors according to data provided by the project initiator, standard process flow charts and regulations (Dayanova, Egorova, Protopopova et al., 2017; Mukhachev, Kolpashchikov, Layshev, 2001; Donchenko, Shelepov, Neustroev, 2008).

⁹ Source: compiled by the authors according to the results of a study of the meat products market and regulatory standards (Donchenko, Shelepov, Neustroev, 2008).

The resulting flows of benefits, as well as investment and operational costs, make it possible to calculate the net benefits and construct the cash flows for the “With Project” scenario (Table 5). As in the “Without Project” scenario, traditional state support was not taken into account when calculating cash flows for the “With Project” scenario to ensure comparability. Meanwhile, by the fifth year, the project generates substantial positive cash flows (+17.8 million rubles) per year, compared to the “Without Project” scenario, where cash flows are deeply negative (see Table 1). Obviously, achieving such a result requires significant investment, which will not be quickly repaid. A simple calculation shows that, if the projected trends continue, the capital costs of the project will be fully recovered by the 20th year of the project without any state or other support. Thus, the overall situation suggests good prospects for the revival of the reindeer herding industry through technological transformation.

Table 5

Cash flows in “With Project” scenario without state support¹⁰, thousands rubles

	Years of the calculation period						
	1	2	3	4	5	...	11
Total investment	61 035	38 857	132 399	43 000	0	...	0
Total operational costs	3 739	4 207	4 475	8 963	8 891	...	8 891
Total benefits, including from the sale of:	0	0	0	26 680	26 680	...	26 680
meat products	0	0	0	23 453	23 453	...	23 453
by-products (categories 1, 2)	0	0	0	1 055	1 055	...	1 055
other products (skins, horns)	0	0	0	2 171	2 171	...	2 171
Net benefits	-64 774	-43 064	-13 6873	-25 283	17 789	...	17 789
Cumulative net benefits	-64 774	-107 838	-244 711	-26 9995	-252 206	...	-145 820

3. Assessment of the project's financial viability

Financial viability is achieved, as is well known, when the cash flows do not show negative net benefits in the “With Project” scenario. Due to the sector's inefficiency and high dependence on subsidies, the project initiator, like other reindeer herders, lacks available funds to invest in the project. Given the shortage of own resources and the inability to attract external funding, the project is deemed financially unfeasible.

The project's financial viability is possible only with external financial support, specifically, direct state investment in capital expenditures (Table 6) and full compensation of operational costs totaling 12.4 million rubles over at least the first three years, when net benefits remain negative.

Table 6

Cash flows in “With Project” scenario with full compensation of capital expenditures¹¹, thousands rubles

	Years of the calculation period						
	1	2	3	4	5	...	11
Compensation of capital costs	61 035	38 857	132 399	43 000	0	...	0
Net benefits after compensation of capital costs	-3 739	-4 207	-4 475	17 717	17 789	...	17 789

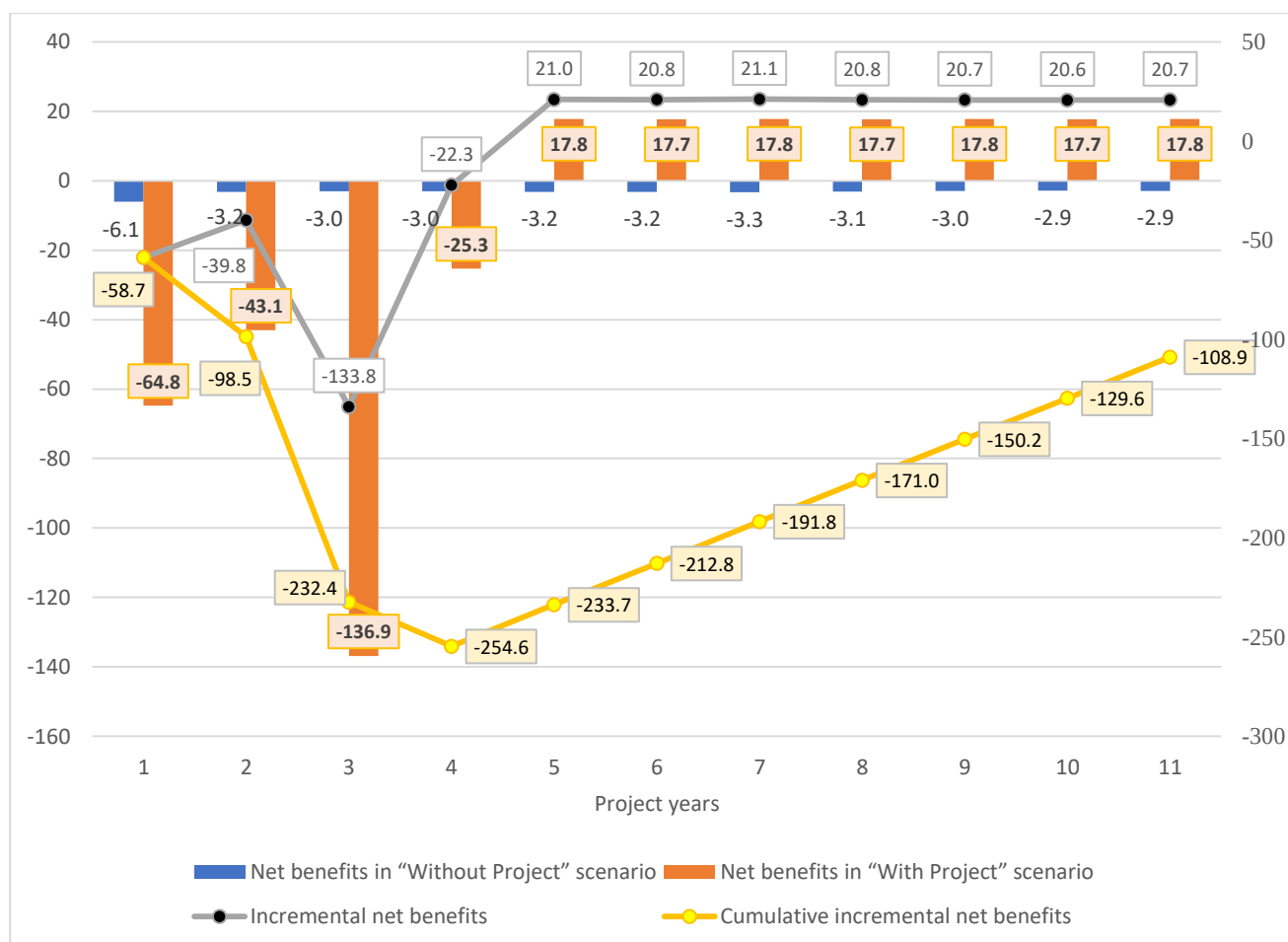
¹⁰ Source: compiled by the authors.

¹¹ Source: compiled by the authors.

Cumulative net benefits	-3 739	-7 946	-12 421	5 296	23 085	...	129 471
Compensation of operatinonal costs	-3 739	-4 207	-4 475				
Net benefits after compensation of capital and operational costs	0	0	0	17 717	17 789	...	17 789
Cumulative net benefits	0	0	0	17 717	35 506	...	141 891

4. Assessment of the project's economic efficiency

If the project's feasibility can be achieved through external funding, it is worth assessing its efficiency. As already noted, according to the methodology used, the efficiency assessment is based on a comparison of the cash flows in the "With Project" and "Without Project" scenarios (Fig. 4). In fact, if a decision is made to implement a project, that is, to introduce new technologies for animal husbandry, slaughter, and product processing ("With Project" scenario), the initiator has to cease production using the old, traditional technology ("Without Project" scenario). This means that, by switching to the new technologies, the initiator forgoes the negative cash flows generated by the old technology (Table 1). In this case, the project itself (without support) is valued higher than the result, which the initiator achieves without taking into account the "Without Project" scenario: -108.9 million rubles (Fig. 4) > -145.8 million rubles (Table 5). It is clear that this is not actual cash that the project will generate, but merely its "advantage" over abandoning it. The result remains negative (albeit not as significant), and this confirms that the project requires external financial support.

Fig. 4. Incremental cash flows without support¹², million rubles

If external support is received in amounts sufficient to cover capital expenditure and operational costs during the critical period (the first three years), the project can be assessed as highly efficient (Fig. 5). All cash flows are strongly positive, ensuring financial stability throughout the entire projection period.

The project's safety margin is so significant that external support measures can include not only grant-based and interest-free government funding, but also borrowing on preferential loan terms and/or flexible debt servicing schemes, such as project financing with a deferral of several years before the start of principal and interest repayments. Some of these financing instruments have been discussed by the authors in previous publications, for example: (Koshelev, Romanyuk, Sukharnikova et al., 2024).

¹² Source: compiled by the authors.

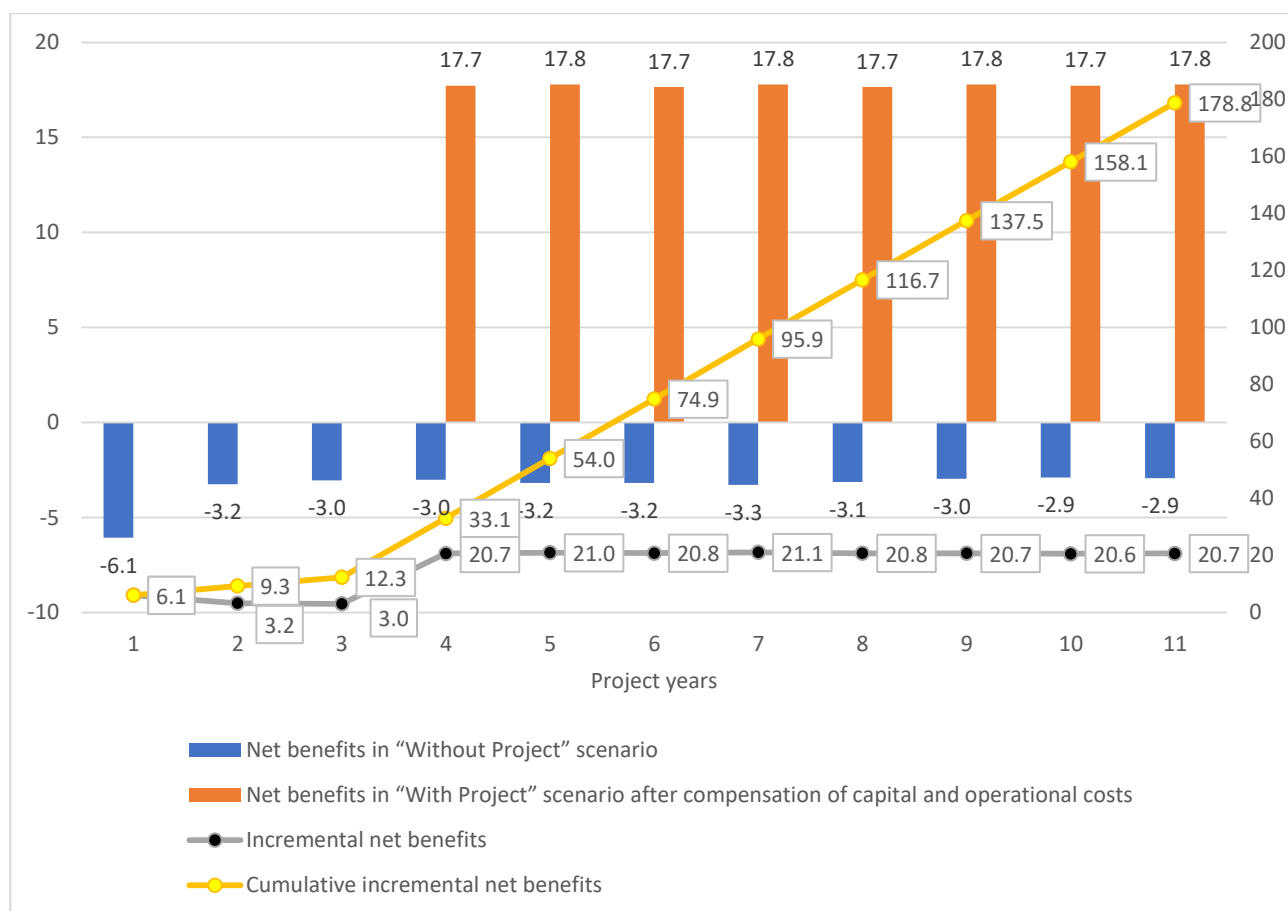


Fig. 5. Incremental cash flows with full support¹³, million rubles

Therefore, the calculations have shown that the project under assessment lacks the necessary financial resilience to begin its implementation unless external support measures are applied. Over the 11-year calculation period, determined by the depreciation periods of the main acquired equipment, the project does not pay back the funds invested in it. However, if the conditions assumed for the calculation period are maintained in the longer term, the project has a realistic chance of demonstrating a positive net effect by the 20th year.

Conclusion

The results of the study suggest that the decline in the northern reindeer herding industry, observed over the past 30–40 years, can be halted. However, this requires a change in the concept of state policy support for the industry. Traditional assistance to reindeer herders in the form of subsidies to cover operational costs and partially restore fixed assets does not allow them to engage in expanded reproduction or even achieve self-sufficiency. Under the current circumstances, a radical shift is required from traditional extensive grazing methods to new, innovative closed-cycle technologies — fenced grazing, slaughtering, processing, production, and sale of finished products with high added value. The analysis has shown that substantial, albeit short-term, financial support during the technological modernization phase (usually within the investment phase)

¹³ Source: compiled by the authors.

ensures the financial feasibility of the project and creates favorable conditions for the sector's transition to full self-financing in the long term (Koshelev, Romanyuk, Sukharnikova et al., 2024).

The financial viability of the project is achieved through support that ensures exclusively positive net benefits in the "With Project" scenario at each step of the calculation period. However, viability alone is not sufficient for a project to be approved. It is also necessary to assess its economic efficiency, which, in turn, is determined by positive integral indicators, in particular, the cumulative positive value of incremental net benefits, calculated as the difference between the net benefits of the "With Project" and "Without Project" scenarios. As research has shown, a positive effect is also impossible throughout the projection period without state support. However, in more distant future (estimated at 20 years), this becomes a completely achievable goal.

Therefore, if the state and society as a whole are interested in resolving the sector's crisis and creating conditions for its sustainable development, the state should review its economic policy, shifting its priority from current financial support for reindeer herding enterprises to investments in fundamental technological transformations of the industry.

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