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## Simulation modelling of public-private partnership in the Arctic regions

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# **Simulation modelling of public-private partnership in the Arctic regions<sup>1</sup>**

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## **Abstract**

Severe climatic conditions, low population density, lack of infrastructure leave all Arctic projects outside the market and allow only nodular economic development of the Russian Arctic territories. The internal structure of these patches of economic activity should be justified with the help of economic-mathematical modeling, and complexes themselves be embedded in the economic complex of the country as a whole. The basis of the author's assessment techniques are scenario calculations on optimization and simulation models.

This becomes of particular importance given that all Arctic investment projects will for sure employ administrative and financial resources of the state along with private initiative. It is argued that the main reason for a bad experience of public private partnership (PPP) lies in the plane of the enterprise-level management and a variety of business solutions, significantly affecting the cash flow and project implementation period. In this connection, the emphasis is made on developing of simulation models and the expansion of plurality of factors evaluated.

On the basis of simulation model for the convenience of running scenario calculations and in the future for the implementation of economic-mathematical support of the negotiation process between project participants was created a "situation room". In order to expand capabilities of simulation tools a raw of new control parameters were embedded into situational room (the result year, the variation of production capacity, the parameter "delay" of the project), and adding the possibility of presenting the results in the dynamics.

The paper presents quantitative data and analysis of PPP options for the implementation of Taimyr-Yakut ATPC projects.

Calculations for justification transport logistics scheme of mining facilities of the complex, together with the definition of the relevant PPP scheme are performed.

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It is proposed the application game theory tools to determine the combination of administrative decisions at all levels.

### **Key words**

Arctic investment projects, simulation modeling, scenario modeling

### **Introduction**

Arctic vector of economic development is now a strategic imperative for the Russian Federation.

The development of Russia's northern territories associated with the implementation on their territory large-scale investment projects on developing natural resources and development of transport infrastructure (in particular - the Northern Sea Route (NSR)). We specify that a large-scale project is defined as the one implementation of which could potentially have a significant impact on intra and inter-sectoral, inter-regional and intra-regional proportions, the pace of socio-economic development, the dynamics of the current resource pricing system. Evaluation of large-scale projects requires the creation of special economic and mathematical tools and techniques of handling it.

This becomes of particular importance given that all Arctic investment projects will for sure employ administrative and financial resources of the state along with private initiative.

At the same time it is impossible to use public private partnership (PPP) templates in the Russian Arctic: best practices might not give results in risky northern conditions. Each group of projects should be simulated and all effects forecasted on the series of evaluative scenario calculations.

The inefficiency of projects with state participation has been widely discussed in the scientific community. However, it is obvious that in the Asian part of the Arctic without state investment projects are doomed to negative assessments by private investors. There is an opinion, and the author supports it, that the main source of uncertainty and opportunistic behavior in connection with the implementation of projects lies at the micro level.

The aim of the present work was to search for opportunities as well as to implement modifications of economic-mathematical models used for the assessment in order to improve the convenience of predictive scenario calculations and expand the analytical capabilities of instruments.

Author believes, the main types of effects that are generated in the process and as a result of implementation of such projects, it is useful to classify the four main categories (see. Table 1).

Evaluation of each of these effects requires appropriate tools. Depending on the level of effects localization the author proposes to produce estimates using economic-mathematical models of national economy level (inter-regional inter-sectoral optimization model - OIIM) and project level (simulation model for coordination of interests - SMCI). Herewith localization of certain effects at the enterprise, region, country level is closely connected with satisfaction of economic interests of project participants - companies, regions and the State.

**Table 1. Classification and assessment levels of projects effects**

Effects type	Result indicators			Assessment level
Direct	Commercial effect: profit of investor	Social sphere: employment, income level		Project
Indirect economic	Cross-industry effects: increase of gross product in other industries (taking into account northern projects specificity)	Inter-regional effects due to the narrowness of economic ties	Intrabranh consequences: the changing balance of supply and demand, prices (in the work not evaluated)	National economy
Redistributive	Fiscal: tax payments of different levels			Project
External	Ecological (in the work not estimated), geopolitical, military and strategic factors			National economy

### **Economic-mathematical tools and methods**

We propose a two-level project assessment procedure based on scenario calculations on optimization and simulation models.

For national economic assessment of Arctic projects of Asian Russia was used the static OIIM staged by B.V.Melentev (IEIE SB RAS) with 38 sectors and 19 districts<sup>2</sup>. This tool is selected for Russia's economic development forecast due to the availability of detailed transport block with a high role of spatial factors in development of the Arctic territories.

For the advantage of this approach stands the ability to track the directions of required structural changes in the economy by inter-branch chains and inter-regional relations, which

<sup>2</sup> Мелентьев Б.В., Ершов Ю.С., Алимпиева А.А. Методические рекомендации построения межрегионального межотраслевого финансового баланса "Платежи-доходы" / ИЭОПП СО РАН. - Новосибирск, 2010. - 144 с. (п.1.2.).

can (with appropriate government policy) and should (otherwise the system would have less effect) lead to implementation of the investigated projects.

In the work assessment of the national economic effect of the project is treated as an upper limit of state support, which may count companies implementing the project and / or associated with it. Inclusion in the business plans of the State's participation in various forms (direct investment, tax holiday, state orders, etc.) can have a positive impact on the commercial attractiveness of the project. The idea of comparing the national economy and the private effect of the project or set of projects based on complex of economic-mathematical models, including OIIM and a multi-period simulation model of investment project, is developed in the work edited by Novikova T.S.<sup>3</sup>, and has much in common with the author's approach.

Frequently large-scale projects and their evaluation are in the area of attention when drawing up regional development strategies. Certainly, the creation of the concept, strategy, program of the territory is an important step for the formation of its future image. However quantitative estimates, calculations are required, and besides one should not be limited forecasting only performance indicators by constructing models of the regional production system<sup>4</sup>, but it is important to make a comprehensive assessment of the variety of options resulting from the decisions made at the micro level - financial, material strategies of enterprises, solutions on the institutional environment corrections.

The peculiar feature of large projects modeling in the northern regions is the need to consider innovative component of the northern economy. The author offers an expert assessment of the potential technological changes at the level of individual industries and make corresponding changes in the technological modes in OIIM. Methodically transition from industry to the national-level economic level in the context of technological progress is described in the Muchnik<sup>5</sup>. These methods designed by specialists in IEIE SB RAS, made in

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<sup>3</sup> Проектная экономика в условиях инновационного развития: модели, методы, механизмы / отв. ред. Т.С. Новикова ; ИЭОПП СО РАН. - Новосибирск : Параллель, 2013. - 163 с.

<sup>4</sup> Хасаев Г.Р., Цыбатов В.А. Технология прогнозирования регионального развития: опыт разработки и использования / Проблемы прогнозирования. 2002. № 3. С. 64-82.; Шмат В.В. [Оценка влияния нефтегазового сектора на социально-экономическое развитие Ханты-Мансийского автономного округа](#). На правах рукописи: диссертация на соискание ученой степени кандидата экономических наук: 08.00.05. - Новосибирск, 2001. 183 с.

<sup>5</sup> Мучник В., Голланд Э. Экономические проблемы современного научно-технического прогресса. Новосибирск. Издательство «Наука». - 1984. - 304 с. (с. 248-264).

1970, in modern social and economic conditions is necessary to supplement with the block of corporate decisions analysis at the project level.

The assessment of the project' effects has been done with the author's simulation model of coordination of interests (SMCI), which includes specific institutional factors. The model actually comprises multiperiodic financial-economic models of individual enterprises. Preparation of financial and economic model of the enterprise is an important part of financial planning for the commercial result-oriented business and at the same time can serve as a starting point for assessing the socio-economic effects of the company's performance at the level of the region and the country. Such model makes it possible to create not only a plan of income and expenses based on various corporate management decisions, but also to take into account the impact of the significant factors of the institutional (legal or economic) environment on the future cash flows.

For compiling financial and economic model it is needed reliable, comprehensive information, taking into account data about the essence of the company, its business processes. Also needed to know trends and tendencies of certain product' markets. In this regard, the construction of financial and economic model should be preceded detailed analysis of financial and economic activity of pattern enterprises, current and investment costs and benefits. The market analysis is carried out to determine the sales capabilities of the enterprise, price growth trends, as well as reviewing existing rules and regulations, which economic agents of the sector operate (institutional settings). Maximum approximation of theoretical model to practical situation enables its implementation, and realization of planned production of goods and services. Thus, the investor already at the pre-stage has the opportunity to analyze sensitivity of key result indicators by changing one or more parameters and make management decisions.

The used model, unlike some similar<sup>6</sup> explicitly contains the parameters of institutional environment, reflecting the financial, logistical and material strategies and preferences of investors, and channels for inter-regional cooperation (key parameters and architecture of the model as well as examples of its application are described in the following

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<sup>6</sup> Проектная экономика в условиях инновационного развития: модели, методы, механизмы / отв. ред. Т.С. Новикова ; ИЭОПП СО РАН. - Новосибирск : Параллель, 2013. - 163 с.; Лавлинский С.М. Модели индикативного планирования социально-экономического развития ресурсного региона. Новосибирск: Изд-во СО РАН, 2008. - 247 с.; Малов В.Ю. Прогнозирование развития проблемных регионов: вопросы методологии и опыт решения прикладных задач: на правах рукописи. Дис. д-ра экон. наук: 08.00.04. - Новосибирск, 1997. - 274 с.

published by the author materials<sup>7</sup>). Thus, at the project level can be estimated internal organizational structure of new production complexes, transport and energy supply options of the anchor resource projects <sup>8</sup>.

Between the above levels of produced estimates is made a comparison on three main areas.

The first is the coordination of the investigated scenarios prerequisites (see table 2) and their formalization in the quantitative parameters. One of the methodological modifications of such comparison is described in the above-mentioned work, edited by T.S. Novikova and has a high degree of detail. Our approach, however, takes into account the specific aspects of the northern territories, so in simulation increases the role of the new, introduced by the author, control parameters.

Thus, we investigated the following factors influencing the effects of the projects:

- 1) Transnationalization of investors' interests
  - 1a) material transnationalization, which consists in export orientation of resource projects opposed the federal interest in deepening the processing in the country;
  - 1б) Financial transnationalization, expressed by the portfolio relation to resource project and the associated withdrawal of financial results outside the country opposed to the retention and use of financial resources within the country;
- 2) The vertical integration of upstream and downstream enterprises, located in different regions of the federation as opposed to a market economy relations and an equitable distribution of effects between the parties;
- 3) Competition of the neighboring regions for sources of territorial development (investment, labor and other resources) as opposed to cooperation on the strategically important objects.

The second area of comparison is bringing cost parameters to a single point in time - the moment of the forecast implementation. To do this, at the project level is introduced a

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<sup>7</sup> Тарасова О.В. Оценка последствий транснационализации интересов частного инвестора при реализации проектов регионального развития // Журнал экономической теории. - 2012. - № 1. - С. 140-144.; Tarasova O. Developing a mechanism of compliance of divergent interests when creating new industrial complexes // Knowledge and business challenge of globalisation in 2011 : proc. 3 Intern. scientific conf. Slovenia, Celje, 17th-18th Nov. 2011 / [M.M. Skok, M. cingula] ; Faculty of commercial and business sciences. - Celje, 2011. - P. 294-298.

<sup>8</sup> Tarasova O.V. Toolkit to estimate the organizational structure of Arctic industrial complexes // The 54th ERSA congress "Regional development & globalisation: best practices". Saint Petersburg, Russia, 26-29 August 2014 [Electronic resource]. - Saint Petersburg, 2014. - USB flash-drive [17 p.].

discount rate - 10%. And the levels of final consumption for 2030 (or 2035, 2040, etc.), obtained as a national economic estimates of scenarios calculated in 2005 prices, are indexed using the consumer price index.

The third direction is the interpretation of national economic evaluation of the project as the top border of the state support, which may count companies implementing the project and / or associated with it.

### **Case-study**

In the Taimyr-Yakut part of aqua-territorial production complexes (ATPC) system, proposed in previous papers<sup>9</sup>, are located unique Tomtor deposit of complex niobium-rare earth ores and Popigai field of impact diamonds. These projects together with sea and river ports and points of overloading, energy supply objects should form the basis of a new economic complex in the Russian Arctic, giving a powerful multi-sectoral inter-regional effects<sup>10</sup>.

In the long term the infrastructure created for these key projects, will attract the second stage projects - Guli, Essey deposits, diamond placers - Ebelyah, small gas fields in the Khatanga area.

When targeting to the domestic consumption of raw materials produced here, in Russia there will occur a qualitative change in basic sectors of application of rare metals and impact diamonds: metallurgy, engineering, construction. In this regard, it is particularly important to analyze the options for the development and consequences of the use of different instruments to support pioneering projects in this part of the Arctic.

Table 2 presents the scenarios generated for the assessment of these anchor projects of the Taimyr-Yakut ATPC.

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<sup>9</sup> Aleshina (Tarasova) O.V. Outlook for the economic development of Northern regions of Asian Russia [Electronic resource] // ERSA Congress Sustainable Regional Growth and Development in the Creative Knowledge Economy, 50th Anniversary European Congress of the Regional Science Association International : congress materials on USB-Storage, Jonkoping, Sweden 2010. - Jonkoping, 2010. - Referred Session for young scientists "L. Regional economic growth and development", paper № 410.

<sup>10</sup> Тарасова О.В. Сырьевые регионы российской Арктики - инновационному развитию страны // Исследования молодых ученых: отраслевая и региональная экономика, инновации, финансы и социология. В 2-х частях / под ред. В.Е. Селиверстова, А.А. Горюшкина ; ИЭОПП СО РАН. - Новосибирск: Изд-во ИЭОПП СО РАН, 2014. - Ч. 1. - С. 267-276. <http://lib.ieie.nsc.ru/docs/2014/IssledMolodih/V1-29Tarasova.pdf>



**Table 2. Correlation of the prerequisites of national economic and project scenarios levels**

Background	The national economy level scenario	Scenario of the project level
Indifference of the state in relation to the economic development of the northern territories: the lack of state support for resource projects in the North, the development of NSR is only for defense purposes	Market	Basic
	Defensive	
An active policy on the development of the mineral complex in the north-east direction, the indifference regarding the use of northern resources in a number of national economy sectors: support for mining projects and primary processing, NSR, lack of incentives for the introduction of northern resource into national industries	Geopolitical	Raw
		Primary processing
		Vertical integration
		Vertical integration with the redistribution of effects
An active policy on the development of the mineral complex in the north-east direction, the indifference regarding the use of northern resources in a number of national economy sectors: support for mining projects and primary processing, NSR and encouraging the introduction of northern resource industries into national industries	Innovation	The pro-Russian
		Mobilizational
		Vertical integration in the conditions of mobilization with the redistribution of effects

The redistributive effects that are crucial in modeling variants of public-private partnerships are valued at the project level within the SMCI (according to Table 1).

To estimate the parameters of interaction of project participants in Taimyr-Yakut ATPC was created a "situation room", which presents only the control parameters and the resulting performance, leaving behind the scenes all the economic-mathematical kitchen.

### **Evaluation results of different PPP scenarios**

In the first phase it was formed 10 scenarios, reflecting various configurations of public-private partnership.

The basic scenario assumes active use of produced industrial diamonds, rare metals and their oxides in the sectors of Russia's economy (80% of Tomtor ore, 40% of Popigaj production is directed to the domestic market at prices below the world). In this case - in the absence of support measures - as one would expect, the commercial effect of both projects in 2030 was negative (with an overall positive effect in 3.765 billion rubles. However, there is the interest of the Russian Federation in innovative changes that become possible through the use of produced raw materials in the economy on the one hand. On the other hand - the Krasnoyarsk Territory interest in obtaining good production practices and monopolistic position in the emerging edges of impact diamond market, as well as the active development

of rare metal industry based on processing of Tomtor ore in Zheleznogorsk. The foregoing gives grounds to distribute between these levels the volume of necessary financing of these projects during the construction phase. We can choose the proportion of co-financing with the help of SMCI in real time. According to two variants of the "return" of State funds considered in Table 3 - total discounted tax payments or on the basis of receipt of the company's share of profits. Equity participation gives the State control levers, as well as additional income. Compared to the basic scenario the overall effect (the sum of the effects of two commercial projects, regional and federal budget effects) grows by 15%.

**Table 3. Forms of state support of investment projects**

№	Forms of public participation		Advantage
1	The direct financial participation	Back on the basis of tax deductions streams	With a high national economic significance of projects it is possible to use the Investment Fund, not the budget
		Back on the basis of receipt of dividends on shares	
2	Preferential taxation, PSA mechanism		Allows the state to receive income without investment
3	State insurance risks (price increase, the unfavorable market conditions)		The expenditure of public funds occurs only upon the occurrence of an adverse situation
4	Subsidizing part of the interest rate on the loan		Allows allocate the costs of the State in time
5	Subsidizing of domestic sales		
6	Stimulating of demand (support for enterprises - product potential buyers, the state order)		
7	Compensation for geological prospecting and other expenses		

Working inside the variant implying preferential taxation, we can choose a particular combination of benefits, allowing to balance the interests of the project participants. Thus, you need to reset the mineral extraction tax, tax on income and property tax for Popigai field. For Tomtor project it is enough to reset mineral extraction tax until payback, as well as to lower the rate of the regional property tax up to 0.017%. Under these conditions, the overall effect remains at the level of the basic scenario, however, the interest of each of the participants individually in the successful implementation of the projects will increase. With all the organizational advantages of production-sharing agreements, this option is not suitable for the development of projects under consideration.

Conducting economic activity in the Arctic is associated with a high level of uncertainty. With the evidence, in the during the project development costs could rise. These additional costs the State can take over. Note that if cost will rise by 45-55% the overall flows of the projects would be negative. In our opinion, this should not be a ground for refusal of projects: a multiplier effect in the whole country, counted by the model of the national economic level, can theoretically be redistributed so as to compensate the losses of the direct participants of the Arctic resource projects.

Calculated the possibility of public procurement or subsidizing domestic sales at unfavorable situation on the world market. Losses total effect in this case is significant, however, government expenditures are spread over time, mitigating the negative effects (see. "Benefits" column in Table 3).

It is also possible compensation by the state of certain types of expenses (exploration, environmental initiatives, etc.). The considered projects fail to achieve a positive commercial effect by using only this tool.

Quite effective appear to be the subsidizing the interest rate on the loan - the overall effect gains compared to the basis case (with a 40% loan to Tomtor and 60% loan to Popigaj) is 23%.

Anyway considered options of public-private partnership should be used in some combination. With the help of the developed tools we are able to identify it on the basis of short-term wishes and possibilities of participants.

The calculations were carried out for two mining projects "in isolation" from the rest of the economy, that is, without taking into account the work of infrastructure industries on the territory of the ATPC. It has been revealed that for the construction of the PPP model is important for the participants to see the effects over time, be able to see the results in any year after the launch of the project, to vary the production capacity, as well as to assess the effects in case of projects mismatching in time.

Thus, the simulation model was modified in the following areas:

1. introduced an opportunity to observe the project's effects in dynamics. It is important when choosing a combination of measures of state support when taking into account the correlation of their effectiveness in various stages of implementation;
2. added a variability of projects' productivity;
3. added an option to specify the result year (up to which a forecast of the development ought to be done, and accordingly, all effects to be shown). The idea was that for different actors of the project different length of the forecast period could be important. Furthermore,

long-term, medium-term and short-term period calculations may be required at once, and later on their correction would need;

4. added a possibility of variation of the construction period (two discrete provisions "handing on time" and "delay"). This is done for the convenience of reference in time of the projects in the case of a delay occurred on one of them and searching a mechanism to respond to such delays.

### **Transportation schemes evaluation results**

The next series of calculations is related to the justification of the transportation scheme of the fields' maintenance. There are works where the transportation options were considered in the context of the choice of the place of processing (Zheleznogorsk, Seversk, Novosibirsk, Solikamsk). We will assess from the point of view of the organizational structure of ATPC and the work of its infrastructure objects. Provided transportation for export and Zheleznogorsk for processing.

The resultant year was appointed 2035, the production capacity at facilities fixed (but can be changed at any time).

4 scenarios of projects development in terms of the transport support of mining projects were formed.

The first scenario - "Southern" simulates a complete disconnection from the arctic theme and infrastructure of NSR development. Both deposits Popigaj and Tomtor pave winter roads to the city Udachny. So their supply is made in a southerly direction, increasing the load on the transport sector there.

The second scenario "Main ports": Popigaj in this case communicates with the port Hatanga, paving the winter road to it, or usina new means of transport. Tomtor works similarly with the port of Tiksi. This scenario aimed to support the development of NSR ports, which in the future will present a large proportion of defense capacities. The last determines weighty State share in the investment pool.

The third scenario: "Interregional competition". It means itself that each field working with the port of the region. Popigaj paves the winter road to Hatanga port, thus developing your Krasnoyarsk region and Tomtor supplied through the nearest river port Yuryung-Khaya, thus developing the republic of Sakha, reducing transportation costs for themselves.

The fourth scenario: "Interregional cooperation" implies a more intensive development of the river port, Yuryung-Khaya: both fields in this version are serviced through it.

Table 4 shows the main resulting indicators of the scenarios: NPV of projects and budgets for 2035, the yield (in parentheses) and the country's total gain.

**Table 4. Distribution of effects in simulated scenarios (bln. Rub.)**

	South	Main ports	Inter-regional competition	Inter-regional cooperation
Tomtor-NPV2035	371 (3%)	262 (3%)	3638 (10%)	3712 (13%)
Popigaj- NPV2035	318 (3%)	1806 (7%)	1379 (5%)	3358 (16%)
Tiksi- NPV2035	-	-1264 (-)	-	-
Khatanga- NPV2035	-	167 (3%)	253 (8%)	-
Yuryung-Khaya - NPV2035	-	-	9 (6%)	890 (18%)
Budget NPV of the Krasnoyarsk Territory	2094	3208	3016	2745
Budget NPV of the Republic of Sakha (Yakutia)	2557	2806	3306	3043
Summary country gain	5530	7168	11788	13920

It is worth noting a negative NPV of the port of Tiksi in the script Main ports. This is due to the small volume of production at the field Tomtor: 100 thousand tons per year does not pay the operation of the Arctic port. One can, however, suggest that by 2035 the port will perform a significant amount of work in connection with the intensification NSR: will accept vessels with a cabotage and transit from Europe to Asia and back load, maintain export and import cargos. At this stage it was not considered.

In terms of total effect the best possible was the last scenario (interregional cooperation). This scenario corresponds to the following PPP scheme. The government actively sponsored the fields, and the port: 20% of the initial investment in the field Tomtor, 5% Popigai, Yuryung-Khaya port is financed by 60% by federal funds and 10% by regional. A large proportion of public investment in the port as a whole fits into commonly known idea that economic development must be preceded by the development of the territory transport at public expense (similar to the Trans-Siberian Railway in the late 19th century).

Regarding a time matching of projects: implementation delays in mining projects reduce the overall effect by 18-26%, whereas the delay in transport projects leads to multiple losses.

The modified model greatly simplifies the work on multiple calculations, expanded the variety of factors of environmental management assessed at the micro level.

### **Game solutions**

Realizing that the task of coordination of investor's interests and interests of the State, we propose apparatus of the game theory to achieve the compromise agreement ex-ante. With the help of simulation model we can assess participants' gains. By the state gains in the study stands an aggregate effect of projects generally equal to sum of tax payments of the all objects by the year 2035, regional and federal budgets receipts, minus outflow of profits and taxes overseas. Thus, we reflect interests of the entire national economy: government is equally concerned about business activity rising, regions and federal revenues, and profits of large companies staying in the country being settled as a real investments, or assets wrapping in the financial system. A gain of business is sum net present value in 2035.

Further the payoff matrix in different combinations of business strategies and actions of the Russian Federation government can be compiled.

As noted above, management solutions of companies bring to the project the greatest uncertainty, extending the boundaries of the projects' effects values. Thus, the company selects the transportation path (discrete variables -  $t_i$  from a set of options), the material and the real strategy (percentage of exports -  $m_j$ ), financial strategy (percentage of output profits abroad -  $f_k$ ), production capacity (tonnes -  $v_m$ ). The task of the State - to select a combination of project support measures (PPPn).

Once the payoff matrix compiled one is invited to find cooperative equilibrium. The author assumes the development of work in this direction.

### **Conclusion**

To evaluate the Arctic large-scale resource extraction projects and related infrastructure projects is needed national economic approach in conjunction with the estimates at the micro level. We propose a two-level project assessment procedure based on scenario calculations on optimization and simulation models.

Applied and being developed on the micro-level approach is popular among researchers, and the variety of factors affecting the results of projects, is great. Introduced in author's simulation model innovation (the result year, the variation of the production capacity,

the parameter "delay" of the project and adding the possibility of presenting the results in dynamics) are timely and relevant.

According to calculations the key fields must be serviced by Yakut port Yuryung-Khaya: economic efficiency determined the interregional nature of industrial complex. The share of public investment (mainly federal, because of the limitations of the republican budget) in its development must be sufficiently high (about 70% of the initial investment).

The apparatus of the game theory is proposed to achieve the compromise agreement between participants of investment projects *ex-ante*. With the help of simulation model assess participants' gains can be assessed, the payoff matrix in different combinations of business strategies and actions of the Russian Federation government can be compiled, one is invited to find cooperative equilibrium.