Innovative approaches to the history of exploitation and new development of the Russian Arctic

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Abstract. The placement of productive forces, endogenous economic growth and innovative search with creative destruction are the three sources of forming the new economic development theory of the Russian Arctic. From the Soviet school the tradition of linking the process of exploitation with the placement of productive forces was used. From the European regional science, the notion that every social process in the regions is subject to the general laws in the framework of the new theory of endogenous economic growth was used. From the North American frontier theory there was used the notion of an innovative search for opportunities for economic development in the newly exploited territory.

The modern process of exploitation is characterized by spatial unevenness, center-peripherality, multiactor, the unprecedented role of resource corporations as agents of glocalization; the heterogeneity of time by the stages of the exploitation process (what was expressed significantly lesser in the planned administrative-command model of new exploitation) and the enormous role of project management (project financing, project legislation developed for a specific project of new resource exploitation). A feature of modern exploitation is that it implies the coexistence of two schemes - “from scratch” and on the foundation of the former infrastructural exploitation which have different effects and regularities in territorial structures, exploitation cycles, etc.

Innovative approaches to the history of exploitation and new development of the Russian Arctic on the example of modern exploitation projects that link the global conjuncture and local technological processes as well as a new nature of an experimental, educational and spatially localized type was considered.

1. Introduction

An ambitious task to create a new theory of the Arctic exploiting from the three main sources - Soviet school of exploiting, European regional science school and the North American frontier theory was undertaken. From the Soviet school the tradition of linking the process of exploitation with the placement of productive forces was used. An important achievement of the Soviet school was the ability to see the process of exploiting not from inside and not as isolated but as a component of the more general process of the new (industrial) placement of the country's productive forces.

From the European regional science, the notion that every social process in the regions is subject to the general laws in the framework of the new theory of endogenous economic growth was used. The theory of endogenous economic growth provides a methodological substantiation of the localization process of exploitation and obtaining effects on localization in the space of a new exploitation. It
implies the adequacy of the theory of localized growth poles for understanding the emerging new economic effects; the suitability of the cluster approach for the study of material and institutional relationships; sharp unevenness by the center-peripheral algorithm, by the development of territories; the need to search for places of application of the agglomeration effect in places of new exploitation (for example, in rotation camps).

From the North American frontier theory, the notion of an innovative search for opportunities for economic development in the newly exploited territory was used. Here it is understood absolutely in the Schumpeterian sense - as creative destruction with the creation of a revolutionary new.

2. The history of the Arctic exploitation theory

The Soviet school of exploiting which emerged in the second half of the twentieth century and strengthened in the 1970-1980s was the direct heir of the best traditions of the Imperial Geographical Society and the school of Russian historians of the 18th - 20th centuries who described the processes of colonization, resettlement and spread of the Russian state. In fact, it was about the exploitation of new lands [1-5]. In the post-war years the traditions of historical reconstructions of the exploitation and settlement of new territories continued the historical geography works [6].

The successful experience of the Soviet school of exploiting clearly demonstrates that for the constructive development of a theory one must have an idea of the new regularities of development and placement of the productive forces the exploiting process is always a part of. What exactly is this new nature of the exploiting process? In general, one can imagine the exploiting process of the last 75 years in the form of three successively deployable models, while of course in real life there was a layering of the new scheme on the still existing one that is the boundaries between them are non-rigid in nature (Table 1).

The model of new spaces exploitation in the USSR took place in the ideology of a uniform “balanced and planned” distribution of placing productive forces. The ideal of the model was the absolute homogeneity (uniformity) of the new industrializing territories of the Arctic in terms of economic development.

Into the new model of development unevenness, centro-peripherality, polarity of space is immanently embedded. Extremely in relief as never before in Soviet times the effects of concentration of exploitation are manifested - its localization in limited areas of economic activity.

For example, currently one third of the priority projects in the Arctic are being implemented in Yamal: the Yamal LNG and Arctic LNG 2 plants, the Sabetta Sea port, the Railway “Northern Latitudinal way”, etc. Theory of growth poles is again gaining popularity for explaining extreme polarization of process of the new model of the Arctic exploitation [7]. The idea of “polarities” of exploitation and development in the USSR was denied by a model of planned and balanced development to which as the ideal the party and economic governing bodies were aimed.

In the former “areal” model of exploitation the issues of distribution of scarce national economic and material resources by “shock construction projects” were absolutely priority because the rates of the development process directly depended on them. In the modern model of exploitation of the production system of a specific project the material and technical resources are considered to be distributed.

The process of exploitation begins from the moment when resources are already delivered. How to “creatively distribute” them on the localized site of a new exploitation is the subject of the main discussion and the issues of external delivery and delivery of production cargo are not of fundamental importance.

Inside the new exploitation it is possible to isolate the option “from scratch” in the ideology of state-corporate partnership and on the foundation of the infrastructure created during the totally state-owned period of Soviet exploitation (Table 2). At the same time, it is critically important in what particular era of exploitation the pioneer infrastructure was created - one thing is in the era of integrated GULAG plants and another thing is in the era of domination of sectoral departments and trusts. The form of created infrastructure frame (continuous linear-node or discontinuous segmented)
and the overall strength of the Jack London effect — the dependence of the new exploitation from past economic activity will depend on this. [8]. In the second case a localized cluster is formed on the basis of the regional territorial production complex created in the former industrial model with simultaneous alteration of previously existing local exploitation structures.

Table 1. Comparison of three historical models of Arctic exploitation

| Scheme of exploitation by the model of integrated plants (1930-1950s) early industrial | Scheme of exploitation by the Soviet departments (1960-1980s) late industrial | Corporate exploitation scheme (1990-2010s) postindustrial |
|---|---|---|
| Main areas | Chukotka Autonomous District Khanty-Mansi Autonomous District Yamalo-Nenets Autonomous District The Republic of Sakha - Yakutia | Senets Autonomous District Northern part of the Yamalo-Nenets Autonomous District Central part of the Republic of Sakha - Yakutia |
| Type of exploitation | All industrial exploitation is pioneering, on the layer of agricultural craft development of the indigenous peoples of the North | Mainly industrial exploitation from scratch, on a layer of agricultural craft exploitation of indigenous peoples of the North | Delineation of postindustrial and industrial exploitation including the previously created industrial layer |
| Territorial structures of the exploitation | Finely dispersed resettlement network Integrated transport network Mining | Linearly-node frame “Segmented” transport network Mining | Center-peripheral network of temporary seasonal land roads and river (sea) routes Mining |
| Dominant type of the exploitation | Mining | Mining | |
| Key exploitation actor and principles of its spatial behavior | Integrated plant, maximum possible self-sufficiency of energy, building materials and food | Oil and gas industry. Industry departments, trusts. Delivery of all the necessary nomenclature of material and technical, construction cargoes and part of food from the outside | Exploitation Oil and gas industry. Resource Corporations Cost savings and because of this reliance on temporary, seasonal life support and resettlement schemes. Localization of the spatial contour of exploitation |
| Key management Institute | Action plan of the corrective labor camp management | State program of exploitation and development | Investment projects |
Table 2. Comparison of two different process algorithms for new (localized) exploitation

| Example                  | Algorithm “from scratch”                          | Algorithm “on the infrastructure of the previous exploitation” |
|--------------------------|--------------------------------------------------|-----------------------------------------------------------------|
| Example                  | Sabetta: Yamal LNG                                | Exploitation of hydrocarbon resources on the territories along the route of gas pipelines of the Republic of Komi |
| Main effect              | Pioneer infrastructure arrangement - effects of localized clustering (integration of mining, processing, energy, transport support) | The Jack London effect: past economic activity affects modern investment decisions and the structure of economic entities (TNC) |
| Effect of the path dependency | Does not work                                    | It is important in which economic epoch the initial infrastructural framework of exploitation was laid. |
| Territorial structures   | Confinement to winter roads, seasonal river and sea routes | Confinement to single-industry cities and districts - local bases of new exploitation |

It does not mean that all modern exploitation of resources and spaces of the Arctic suddenly becomes “acute” - island and enclave. At the same time the regularities of the past industrial (areal) exploitation continue to exist and new development zones are being formed.

For example, development of new and technogenic deposits of the Upper Kolyma basin goes on, areal forest exploitation in the Irkutsk Region, the Republic of Karelia, and the Krasnoyarsk Region goes on. But here are the regularities of spatial distribution of productive forces inherited from the previous economic era. They are extremely important and important for a significant part of the Arctic regions.

At the same time in the flagship new gold development projects of the Chukotka Autonomous District, in the new oil and gas exploration projects of Yamal, Yakutia and on the Arctic shelf a new postindustrial exploitation patterns begin to work, in which new technological capabilities provide a significant concentration and intellectualization of economic enclaves, new knowledge-intensive support exploitation bases are being formed, which acquire an unprecedented significance and are usually placed in the nearest major scientific and educational centers.

3. New regularities of exploitation in the implementation of megaprojects in the Arctic

During the past 15 years, resource corporations in Russia have begun implementing several completely new, sustained in the new ideology projects in the Arctic. These projects are construction and operation of the “Prirazlomnaya” platform for the extraction of hydrocarbons on the shelf of the Pechora Sea, creation of the Varandey terminal for the shipment of oil from neighboring fields and the southern areas of the Timan-Pechora province, exploitation of the Novoportovskoye field, oil and gas fields of Evenkia, pilot development of a coal field in the Taimyr basin, exploitation of the Pavlovskoe lead-zinc ore deposit in Novaya Zemlya, creation in the Sabetta village of an industrial complex of the Yamal LNG plant, seaport and other [9].

The previous industrial exploitation was tied to a wide areal but the new (postindustrial) one was largely related to a specific project-growth pole (Table 3). It is not surprising that the term “exploitation program” has practically disappeared from the modern lexicon but the concept of “exploitation project” is actively used. Earlier the main economic effects were obtained within the district or regional territorial and industrial complexes (TIC).

At the present stage economic effects are formed within a localized exploitation cluster. Because of this the whole algorithm of the new exploitation process including the project approach - project
management, project financing, “project” legislation in a particular modern exploitation practice becomes different.

Previously the state-funded areal, front, highway of new exploitation and now a corporation-funded pilot project and a clone project that perceives the best practices from the pioneer project as is seen on the example of Yamal LNG - Arctic LNG-2.

The similar logic can be observed in the implementation of modern infrastructure projects: they are now always divided into sections and each section exists as a completely separate and autonomous (modular) project which can be separately combined with the existing road network. That is why in order to affirm the priority of flexibility of combinatorial effects the notion of a route which proceeded precisely from the indivisibility of the whole highway dies out. For example, in such a “divisional” logic a project of the Northern latitudinal way construction which will connect the Obskaya station of the Northern Railway with the Korotchaevo station of the Sverdlovsk Railway is being implemented. The highway will include the Obskaya-Salekhard railway section, Salekhard-Nadym section, combined bridges crossings across the Ob and Nadym rivers as well as Nadym-Pangody, Pangody-Novy Urengoy, Novy Urengoy-Korotchaevo railway sections to be completed.

In real exploiting practice there is a coexistence of new projects developed in a completely new postindustrial ideology and projects that preserve the regularities of the industrial age [10].

In Soviet times many open deposits with a complex genesis requiring a special (“experimental”) approach to exploit became projects that are economically viable only at the present time. For example, the Novoportovskoye oil and gas field was discovered in 1964. But due to its inhomogeneous and heterogeneous nature it is not a classical gas-condensate field, but a complex of local oil lenses that are not very clearly connected with each other, with the presence of a heavy gas cap. Because of this its exploitation began half a century later only in 2014. And there are many such examples in the Russian Arctic.

All elements of the modern exploitation process are specifically studied to ensure the economic and technological effectiveness of the experimental search: the “Prirazlomnoye” project became for PJSC “Gazprom Neft” an experimental platform for developing new offshore oil production technologies, the Yamal LNG project first relied on the experimental transportation by gas carriers which only later became regular. For years experimental transit routes through the Northern Sea Route have been carried out in order to build up the necessary competencies and best practices, amend existing technical and technological regulations, legal regulation of intercontinental high-latitude navigation, etc. [11].

This is a modern new regularity - the processes of experimentation and experimental development are deeply rooted into the nature of the modern process of exploitation. It aims to provide savings on training, rapid acquisition of experience, new knowledge and mining practices in unprecedented new and difficult conditions: working out on the Arctic shelf deposits, application of innovative ore dressing technologies. For example, heap leaching methods for extracting gold using hazardous substances which due to of the extreme localization of the exploitation processes have shown their applicability from the point of view of environmental protection.

The more complex and intellectual the new exploitation project the more it relies on external exploitation bases which in the former industrial model performed mainly supply-distribution functions. The intellectual functions of external bases - traditional staffing and supply of basic means of production are of great importance.

Sometimes such bases are literally hand-made such as the creation of the Center for the construction of large-capacity offshore structures in the village of Kamenka in the Murmansk Region which plans to build three floating LNG plants for their installation in the Ob Bay at the initial stage.
Table 3. Comparison of typical projects of the industrial and postindustrial era

| Nature of the resource project | Industrial exploitation projects | Postindustrial exploitation projects |
|--------------------------------|----------------------------------|-------------------------------------|
| The project is immersed in the context of the district / regional economic area of the new exploitation, is connected with its objects by a permanently operating road network (a single regional TIC industrial area) | TIC-type combinations of projects on a vast area of new exploitation | Inside the localized site of the project the entire integration cycle of extraction and processing is located |

| Nature of the infrastructure project | Consolidation of infrastructure projects (highway) | “Segmentation” of infrastructure projects and the possibility of a separate combinatorics of each site with the environment and its territorial structures |
|-------------------------------------|---------------------------------------------------|--------------------------------------------------------------------------------|
| Ideology of tight conjugation of the production, transport and energy subsystems in the district / regional circuit | Network of platforms: ideology of replication of piloted advanced technological, organizational, institutional practices on other projects-analogues (clones) |

| Spatial system | Ideology of tight conjugation of the production, transport and energy subsystems in the district / regional circuit |
|----------------|---------------------------------------------------------------------------------------------------|

| Actors | State superorganizations | TNC |
|--------|--------------------------|-----|
| Placement | Stationary single-industry city | Rotational camp |

| Support system | Hierarchical system of supporting exploitation bases - rear, outpost, local | A network of equal supply bases, training, transport |
|----------------|---------------------------------------------------------------------------------|------------------------------------------------------|

| Communication with suppliers and consumers | Monopoly supplier and consumer of project products inside the country (vertical integration) | Dozens of suppliers and consumers from around the world (network) |
|---------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------|

| Production strategy of key exploitation actor | Uniform resource production the entire life cycle of the project | Efforts to differentiate exploitation products |
|-----------------------------------------------|------------------------------------------------------------------------|--------------------------------------------------|

4. Conclusions
The article considers innovative approaches to the history and new development of the Russian Arctic on the example of modern exploitation projects that link the global conjuncture and local technological processes as well as a new nature of an experimental, educational and spatially localized type.

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