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Classification of Innovative Reproduction Types of the Enterprises Main Funds in Rocket and Space Industry

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Abstract— **The variants of reproduction of the basic production assets of enterprises by types of reproduction and service life are presented, as well as the classification of variants of reproduction of fixed assets by innovative features is given. The concept and strategy of development set a difficult task for the enterprises of the rocket and space industry to ensure the strategy of innovative reproduction of fixed production assets. The need to accomplish the task in a changing economic environment and a high level of uncertainty of the decisions leads to the need for classification of types (species) of reproduction of fixed assets of enterprises and the selection of those variants that have an innovative component. Typification will determine the existing types of reproduction of fixed assets of enterprises of the rocket and space industry, and their classification based on innovative features will identify options that implement the strategy of innovative reproduction. Thus, the created classification of innovative types of reproduction of fixed productive assets has an essential practical significance, since it gives a detailed idea of the particular option innovative characteristics. Also, the carried typification allows proceeding to the solution of the problem of improving the methodology and developing methodical tools for strategic planning of innovative reproduction of fixed production assets at enterprises of the rocket and space industry.**

Keywords— Innovative Reproduction of Fixed Production Assets, Classification of Reproduction Options.

1. INTRODUCTION

In the Concept of Long-Term Social and Economic Development of the Russian Federation for the period up to 2020, the goal of the national policy in the rocket and space industry (RCI) is the creation of an economically sustainable, competitive, diversified rocket and space industry.

One of the priorities of the state policy is the modernization of the technological level of the RCI: technical and technological re-equipment of industry enterprises, the introduction of new technologies, the optimization of the technological structure of the industry [1,2].

In accordance with the provisions of the Concept of Long-Term Social and Economic Development, the RCI Development Strategy has been developed for the period up to 2015 [3,4].

2. LITERATURE REVIEW

One of the goals of the strategy is to overcome the "significant technological gap from the developed countries", as a result of which by 2015 the share of new industrial equipment in the industry should increase to 33-35% from the current 3%.

Thus, the concept and strategy of development pose a difficult task for the enterprises of the RCP to ensure the strategy of innovative reproduction of fixed productive assets (FPA) [5,6]. The need to accomplish the task in a changing economic environment and a high level of uncertainty of the decisions lead to the need for classification of types (species) of reproduction of fixed assets of enterprises and the selection of those variants that have an innovative component. Typification will determine the existing types of reproduction of FPA of enterprises of the RCI and their classification based on innovative features will identify options that implement the strategy of innovative reproduction [7,8,9].

We will examine the existing types of reproduction (simple and expanded) [10,11].

Differences in quality and quantity of reproduced elements of the production process determine additional characteristics of the types of reproduction: intensive or extensive patterns of expansion of production. The defining sign of the extensive expansion of production is the quantitative growth of the individual production forces of the enterprise, and intensive - their qualitative changes [12].

3. PROBLEM STATEMENT

As follows from the foregoing, the types of reproduction assume a change in the quantitative and qualitative parameters of the products produced. This circumstance makes it possible to distinguish different types of reproduction on the basis of the construction of the matrix.

The process of individual reproduction (reproduction within the enterprise) exists within the social reproduction and, unlike it, it is more dynamic and receptive to the movement of consumers and scientific and technological progress.

For individual reproduction, the situation is aggravated by the influence on the production parameters of the competitive environment. Taking into account this remark, let us consider the features of the reproduction of fixed production assets in the system of individual reproduction. Reproduction of fixed assets is associated with the features of their participation in the production process: they participate entirely, and the

transfer of their value to the value of the finished product occurs by piecemeal during its depreciation.

Table 1. Reproduction matrix quantitative parameters of the products produced

qualitative parameters of the products produced	Constant product quantity	Increasing the quantity of products
Constant product quality	1. Simple reproduction	2. Extensive expansion of production
Increasing the quality of products	3. Intensive expansion of production	4. Extensive-intensive expansion of production

It is known that wear is carried out in two forms: physical and moral. Physical wear is understood as the loss of FPA's consumption value in connection with their use, as well as under the influence of the forces of nature. Moral wear is a consequence of the movement of consumer preferences, when with the help of these fixed assets it is impossible to provide the required product quality, as well as scientific and technological progress when competing types of technical devices of production occur [13,14,15].

The existence of two types of wear leads to a separation of the service life of fixed assets into physical and economic assets and their relatively independent existence [16].

At the present time, the moral wear has a priority value in the development and implementation of the strategy of innovative reproduction of fixed assets of enterprises of the RCI.

Table 2. Matrix of variants of reproduction of the enterprise basic production assets.

		Types of reproduction of elements of the production process			
		Simple reproduction	Expanded reproduction		
			Extensive expansion of production	Intensive expansion of production	Extensive-intensive expansion of production
period of reproduction of FPA	Normative	1.1. Simple normative reproduction	2.1. Extensive normative expansion of production	3.1. Intensive normative expansion of production	4.1. Extensive-intensive normative expansion of production
	Reduced, accelerated	1.2. Simple accelerated reproduction	2.2. Extensive accelerated expansion of production	3.2. Intensive accelerated expansion of production	4.2. Extensive-intensive accelerated expansion of production

Therefore, options for the reproduction of fixed productive assets are formed on the basis of a combination of two characteristics: the type of reproduction of the elements of the production process and the period of reproduction (lifetime) of FPA [17].

Next, we will classify the types of reproduction defined above by innovative features. The analysis [18,19,20] of literary sources has shown that there are various classifications of innovations that differ in the principles of grouping and the methods of organization.

4. Results

As a result of the analysis, eight main innovative classification features were identified that take into account the particular qualities of innovative reproduction. Some of the features overlap, the separate types of innovations based on them partly duplicate each other. Despite this, the suggested characteristics as a whole make it possible to obtain a volumetric characteristic of the studied reproduction types aggregate (Table 4).

1. According to the degree of novelty, innovations are divided into: basic, improving, pseudo-innovation.
2. In terms of implementation, innovations are divided into: steady, fast.
3. On the scale of distribution at the enterprise, they are divided into: within the unit, within the enterprise.
4. By the duration of the innovation process, they are divided into: short-term, medium-term, long-term.
5. By sources of financing, innovations are divided into: own, borrowed, mixed.
6. In terms of complexity, innovations are divided into: simple, average and complex.
7. According to the presence of government funding sources in innovations, they are divided into: government, non-government and mixed financing.
8. By the nature of meeting the needs: to meet new needs; to meet existing needs.

To approbate the reproduction options identified by innovative features, a subdivision of large machine-building enterprise manufacturing products for the oil, gas and energy industries was taken. Various strategies (types of reproduction) of the equipment park were calculated. Estimated data on the required volume of investment on reproduction types (strategies) are presented in Table 3. Based on the calculations performed, it can be concluded that the best strategy for the reproduction of equipment is the strategy of extensive accelerated expansion of production. A suitable form of reproduction for this strategy will be technical re-equipment.

Table 3. The required volume of investment resources according to equipment reproduction options, rub.

Option	Expenses
Extensive normative expansion of production	62616680
Extensive accelerated expansion of production	31972830
Intensive normative expansion of production	68899900
Intensive accelerated expansion of production	47054560
Extensive-intensive normative expansion of production	65542860
Extensive-intensive accelerated expansion of production	37243190

Based on the characteristics of the classification obtained, it can be concluded that only the options for intensive expansion of production and extensive-intensive expansion of production have a truly innovative potential.

5. CONCLUSION

Thus, the created classification of innovative types of reproduction of FPA has an essential practical significance, since it gives a detailed idea of the innovative characteristics of one or another option. Also, the typification carried out allows proceeding to the solution of the problem of improving the methodology and developing methodical tools for strategic planning of innovative reproduction of FPA at enterprises of the RCI.

Table 4. Characteristics of reproduction types identified by innovative features.

№	Innovative features	Types of reproduction of FPA			
		Simple standard reproduction	Extensive standard expansion of production	Intensive standard expansion of production	Extensive-intensive standard expansion of production
1.	degree of novelty	pseudo-innovation	improving	basic	basic, improving
2.	terms of implementation	steady	steady	steady	steady
3.	the scale of distribution	within the unit	within the unit	within the enterprise	within the enterprise and within the unit
4.	duration of the innovation process	short-term	medium-term	long-term	long-term, medium-term
5.	sources of financing	own	own, borrowed	mixed	mixed
6.	level of complexity	simple	average	complex	complex
7.	presence of state funding sources	non-government	non-government	mixed	mixed
8.	the nature of meeting the needs	existing needs	existing needs	new needs	new and existing needs

Table 4 (cont.). Characteristics of reproduction types identified by innovative features.

№	Types of reproduction of FPA			
	Simple accelerated reproduction	Extensive accelerated expansion of production	Intensive accelerated expansion of production	Extensive-intensive accelerated expansion of production
1.	pseudo-innovation	improving	basic	basic, improving
2.	fast	fast	fast	fast
3.	within the unit	within the unit	within the enterprise	within the enterprise and within the unit
4.	short-term	medium-term	long-term	long-term, medium-term
5.	own	own, borrowed	mixed	mixed
6.	simple	average	complex	complex
7.	non-government	non-government	mixed	mixed
8.	existing needs	existing needs	new needs	new and existing needs

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