

## УДК 656.2

S. MYAMLIN<sup>1</sup>, D. BARANOVSKIY<sup>1\*</sup><sup>1\*</sup>Dnipropetrovsk national university of railway transport named after academician V. Lazaryan, Lazaryan, 2, Dnepropetrovsk, Ukraine, 49010, e-mail: denisbaranovskiy@mail.ru**THE MODELING OF ECONOMIC EFFICIENCY OF PRODUCTS CARRIAGE-BUILDING PLANT IN CONDITIONS OF DYNAMIC PRICING**

**Purpose.** The purpose of the work is modeling of economic efficiency of products manufactured by carriage-building plant in conditions of dynamic pricing for different levels to engineering industry controls. **Methodology.** Economic feasibility of engineering production estimate for economic performance indicators and efficiency is profitability. Profit is economic results, showing the absolute result of the activity of engineering production, excluding used resource. To determine the cost-effectiveness should be applied relative index – profitability, which characterizes the amount of profit received from each monetary unit invested in production. **Findings.** Indicator of the general level of profitability indicates the general production efficiency of the company and is determined by the ratio of the balance sheet profit to the amount of value of fixed assets and revolving funds. This figure shows how effectively the material resources of the enterprise, thus characterizing the efficiency of investing in the production of the monetary unit. In the context of dynamic pricing was simulated indicator of economic efficiency of products manufactured by carriage-building plant. In addition, this model allows doing the operational control of the economic efficiency of the engineering industry at a variety of price changes on the world market. Indicator of the general level of profitability indicates the general production efficiency of the company and is determined by the ratio of the balance sheet profit to the amount of value of fixed assets and revolving funds. This figure shows how effectively the material resources of the enterprise, thus characterizing the efficiency of investing in the production of the monetary unit. In the context of dynamic pricing was simulated indicator of economic efficiency of products manufactured by carriage-building plant. In addition, this model allows doing the operational control of the economic efficiency of the engineering industry at a variety of price changes on the world market. **Originality.** Has been further developed a model that describes the indicator of economic efficiency of products, which is produced by carriage-building factories in conditions of dynamic pricing at diversification of engineering production. **Practical value.** Developed model allows doing the operational control of the economic efficiency of the engineering industry at a variety of price changes on the world market.

*Keywords:* profitability, dynamic pricing, carriage-building plant, economic efficiency.

**Introduction**

One of the main industries in the world is mechanical engineering. Machine-building complex - one of the most important in the industry of Ukraine: it combines the system of research and design and technology organizations.

Status and development of mechanical engineering is essential not only for the industry but also for the economy as a whole. In turn, the rail industry is a multi-production [1-5]: it creates not only the basic transport products - transportation, but also has an extensive system of auxiliary production. Products auxiliary production created for

the needs of railway transport as well as for external customers.

According to Ukrainian Railways [4, 7], about 130 billion Hryvnia railways are planning invest in the renewal of rolling stock until 2020.

In addition to solving the problem of shortage of wagons and locomotives, the railways decide the efficient use of rolling stock. When this update is focused on the acquisition of modern and high-rolling.

In total, the program up to 2020 is expected to purchase more than 3.5 thousand passenger carriages, 442 passenger locomotives, 125 diesel locomotives, 236 electric trains, 133 diesel trains and several other passenger units.

Freight rolling stock to 2020 must be supplemented by 79.8 thousand freight carriages, 24.4 thousand containers, 765 freight locomotives and about 1.5 thousand units shunting and track machines.

According to preliminary data for the production of most of the machines is enough capacity of domestic plants, but some passenger carriages, locomotives and railway equipment, which is not produced in Ukraine, will be acquired abroad.

It is assumed that, due to the implementation of the program, the volume of freight traffic will increase by 21%, and the passengers by 11%.

Given the dynamics of changes in the value of pricing and production costs, developed one of the possible approaches to determine adequate operational changes in the economic efficiency of products manufactured by carriage-building plant.

### **Purpose**

The purpose of the work is modeling of economic efficiency of products manufactured by carriage-building plant in conditions of dynamic pricing for different levels to engineering industry controls.

### **Methodology**

Economic feasibility of engineering production estimate for economic performance indicators and efficiency is profitability. Profit is economic results, showing the absolute result of the activity of engineering production, excluding used resource. To determine the cost-effectiveness should be applied relative index – profitability, which characterizes the amount of profit received from each monetary unit invested in production.

### **Findings**

Significant differences in the cost of individual elements for the manufacture of railway rolling stock, along with changes in functioning forms of economic activity, due to the reform of the various spheres of engineering production. Modifications are not limited to the production of certain types of machinery products, but also for its major industries. These changes are an industry-wide in nature. In the engineering field of economics research, mainly focused on the development of the general trends in the producer and to a lesser extent on the basic components of the process. Therefore it is

necessary to concentrate the efforts of scientists at the full definition of those aspects of engineering sectors of the economy, which ensure the implementation of processes for production of engineering products. Firstly, it applies to the costs in the total dimension, and to the costs in the context of individual articles that reflect their structure, and this is a true reflection of reality, which was formed under the influence of factors internal and external environment on a certain period of operation of the or other economic units [3, 6].

The need for specialized economic information leads to the necessity of development and mining of economically specialized circuit traceability. Improving the operational control of the economic system will lead to more effective management of engineering production, which has a positive impact on the economic, financial and economic performance of the industries and enterprises for the production of railway rolling stock.

Improving accounting is impossible without addressing the issue from the perspective of operational control under dynamic pricing. The introduction of such a system will determine the economic efficiency of the production carriage-building plants at various stages of the production process, which will give an objective vision of the change in the efficiency of production in the required information and time interval [4, 6].

Dynamics of prices has a direct impact on the formation of the structure of production overheads, which in turn affects the economic efficiency and cost-effectiveness of production carriage-building plants. These indicators are directly dependent on the pricing policy.

Economic feasibility of engineering production estimate for economic performance indicators and efficiency - profitability. Profit - economic results, showing the absolute result of the activity of engineering production, excluding used resource [4, 6]. To determine the cost-effectiveness should be used relative measure of [5-7] - profitability, which characterizes the amount of profit received from each monetary unit invested in production. Depending on the analytical objectives are the following indicators to assess the economic efficiency of the engineering enterprise:

- The overall level of profitability;
- Return on productive assets;
- Return on assets;
- Return on equity;
- Profitability of engineering products;

- Profitability of a certain type of engineering products.

Indicator of the general level of profitability indicates the general production efficiency of the company and is determined by the ratio of the balance sheet profit to the amount of value of fixed assets and revolving funds.

This figure shows how effectively the material resources of the enterprise, thus characterizing the efficiency of investing in the production of the monetary unit.

Given the diversification of engineering production [3-6], modeling efficiency of production of carriage-building plants in conditions of dynamic pricing, we suggest using the following formulas (1) - (6):

$$P_c = \frac{P_b \cdot K_v}{K_s \cdot K_p}, \quad (1)$$

where  $P_c$  – profitability of a particular type of product carriage-building plant; calculated;  $P_b$  – profitability of a particular type of product carriage-building plant, base;  $K_v$  – the coefficient of variation of costs of production of a particular type of product carriage-building plant;  $K_s$  – the coefficient of change sale price of a particular type of product carriage-building plant;  $K_p$  – the coefficient of change of productivity in the manufacture of a particular type of product carriage-building plant.

In this case, the coefficient of variation of costs of production of a particular type of product carriage-building plant calculated as follows:

$$K_v = \frac{C_c}{C_b}, \quad (2)$$

where  $C_c$ ,  $C_b$  – the cost of the cost of production of a particular type of product carriage-building plant, the calculated value and the basis, respectively:

$$C_c = \frac{C_{cm} \cdot S_{cm} + C_{cw} \cdot S_{cw} + C_{ce} \cdot S_{ce} + C_{ca} \cdot S_{ca}}{100} + \frac{C_{ct} \cdot S_{ct} + C_{cp} \cdot S_{cp} + C_{co} \cdot S_{co}}{100}; \quad (3)$$

$$C_b = \frac{C_{bm} \cdot S_{bm} + C_{bw} \cdot S_{bw} + C_{be} \cdot S_{be} + C_{ba} \cdot S_{ba}}{100} + \frac{C_{bt} \cdot S_{bt} + C_{bp} \cdot S_{bp} + C_{bo} \cdot S_{bo}}{100}, \quad (4)$$

where  $C_{cm}$ ,  $C_{bm}$  – the cost components of products and materials required for the production of a particular type of product carriage-building plant minus the cost of waste; the calculated value and the basis, respectively;  $S_{cm}$ ,  $S_{bm}$  – the share of the cost of the product components and materials required for the production of a particular type of product carriage-building plant less the value of waste as a percentage, the calculated value and the basis, respectively;  $C_{cw}$ ,  $C_{bw}$  – expenditure on wages with deductions in the production of a particular type of product carriage-building plant, the calculated value and the basis, respectively;  $S_{cw}$ ,  $S_{bw}$  – the share of expenditure on wages with deductions in the cost structure of a particular type of product carriage-building plant, as a percentage, the calculated value and the basis, respectively;  $C_{ce}$ ,  $C_{be}$  – the cost of electricity for the production of a particular type of product carriage-building plant, the calculated value and the basis, respectively;  $S_{ce}$ ,  $S_{be}$  – share of the cost of electricity in the cost structure of a particular type of product carriage-building plant, as a percentage, the calculated value and the basis, respectively;  $C_{ca}$ ,  $C_{ba}$  – depreciation expense for the production of a particular type of product carriage-building plant, the calculated value and the basis, respectively;  $S_{ca}$ ,  $S_{ba}$  – share of depreciation deductions in the cost structure of a particular type of product carriage-building plant, as a percentage, the calculated value and the basis, respectively;  $C_{ct}$ ,  $C_{bt}$  – the cost of transport operations on the production of a particular type of product carriage-building plant, the calculated value and the basis, respectively;  $S_{ct}$ ,  $S_{bt}$  – share of the cost of transport operations in the cost structure of a particular type of product carriage-building plant, as a percentage, the calculated value and the basis, respectively;  $C_{cp}$ ,  $C_{bp}$  – the cost of maintenance of process equipment for the production of a particular type of product carriage-building plant, the cal-

culated value and the basis, respectively;  $S_{cp}$ ,  $S_{bp}$  – share of the cost of maintenance in the cost structure of a particular type of product carriage-building plant, as a percentage, the calculated value and the basis, respectively;  $C_{co}$ ,  $C_{bo}$  – value of other costs of production of a particular type of product carriage-building plant, the calculated value and the basis, respectively;  $S_{co}$ ,  $S_{bo}$  – share of the cost of other expenses in the cost structure of a particular type of product carriage-building plant, as a percentage, the calculated value and the basis, respectively; 100 – the sum of all costs of production of a particular type of product carriage-building plant, in percentage.

Also, the coefficient of variation sale price of a particular type of product carriage-building plant is calculated as follows:

$$K_s = \frac{SP_c}{SP_b}, \quad (5)$$

where  $SP_c$ ,  $SP_b$  – selling price of a particular type of product carriage-building plant, the calculated value and the basis, respectively.

The coefficient of change in productivity in the manufacture of a particular type of product carriage-building plant can be found from the expression:

$$K_p = \frac{PP_c}{PP_b}, \quad (6)$$

where  $PP_c$ ,  $PP_b$  – the productivity of a particular type of product carriage-building plant, the calculated value and the basis, respectively.

### Originality and practical value

Has been further developed a model that describes the indicator of economic efficiency of products, which is produced by carriage-building factories in conditions of dynamic pricing at diversification of engineering production. This model allows doing the operational control of the economic efficiency of the engineering industry at a variety of price changes on the world market.

### Conclusions

In the context of dynamic pricing was simulated indicator of economic efficiency of products manufactured by carriage-building plant. In addition, this model allows doing the operational control of the economic efficiency of the engineering industry at a variety of price changes on the world market.

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## МОДЕЛИРОВАНИЕ ЭКОНОМИЧЕСКОЙ ЭФФЕКТИВНОСТИ ПРОДУКЦИИ ВАГОНОСТРОИТЕЛЬНЫХ ЗАВОДОВ В УСЛОВИЯХ ДИНАМИЧЕСКОГО ЦЕНООБРАЗОВАНИЯ

**Цель.** Моделирование показателя экономической эффективности продукции, выпускаемой вагоностроительными заводами, в условиях динамического ценообразования для различных уровней контроля машиностроительной отрасли. **Методика.** Экономическую целесообразность машиностроительного производства оценивают по экономическим показателям результативности и эффективности – рентабельности. Прибыль – экономический результат, показывающий абсолютный результат деятельности машиностроительного производства без учета использованных при этом ресурсов. Для определения экономической эффективности следует применять относительный показатель – рентабельность, характеризующий объем прибыли, полученной с каждой денежной единицы, вложенной в производство. **Результаты.** Показатель общего уровня рентабельности предприятия указывает на общепроизводственную эффективность деятельности предприятия и определяется отношением балансовой прибыли к сумме стоимости основных производственных фондов и нормативных оборотных фондов. Этот показатель показывает, насколько эффективно используются материальные ресурсы предприятия, характеризуя при этом эффективность инвестированной в производство денежной единицы. В условиях динамического ценообразования проведено моделирование показателя экономической эффективности продукции, выпускаемой вагоностроительными заводами. Кроме того, полученная модель позволяет производить оперативный контроль экономической эффективности машиностроительной отрасли при различных ценовых изменениях на мировом рынке. **Научная новизна.** Получила дальнейшее развитие модель, описывающая показатель экономической эффективности продукции, выпускаемой вагоностроительными заводами в условиях динамического ценообразования при диверсификации машиностроительного производства. **Практическая значимость.** Данная модель позволяет производить оперативный контроль экономической эффективности машиностроительной отрасли при различных ценовых изменениях на мировом рынке.

*Ключевые слова:* рентабельность, динамическое ценообразование, вагоностроительный завод, экономическая эффективность

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## МОДЕЛЮВАННЯ ЕКОНОМІЧНОЇ ЕФЕКТИВНОСТІ ПРОДУКЦІЇ ВАГОНБУДІВНИХ ЗАВОДІВ В УМОВАХ ДИНАМІЧНОГО ЦІНОУТВОРЕННЯ

**Мета.** Моделювання показника економічної ефективності продукції, що випускається вагонобудівними заводами, в умовах динамічного ціноутворення для різних рівнів контролю машинобудівної галузі. **Методика.** Економічну доцільність машинобудівного виробництва оцінюють за економічними показниками результативності й ефективності – рентабельності. Прибуток – економічний результат, що показує абсолютний результат діяльності машинобудівного виробництва без урахування використаних при цьому ресурсів. Для визначення економічної ефективності слід застосовувати відносний показник – рентабельність, що характеризує обсяг прибутку, отриманого з кожної грошової одиниці, вкладеної у виробництво. **Результати.** Показник загального рівня рентабельності підприємства вказує на загальновиробничу ефективність діяльності підприємства і визначається відношенням балансового прибутку до суми вартості основних виробничих фондів і нормативних оборотних фондів. Цей показник показує, наскільки ефективно використовуються матеріальні ресурси підприємства, характеризуючи при цьому ефективність інвестованої у виробництво грошової одиниці. В умовах динамічного ціноутворення проведено моделювання показника економічної ефективності продукції, що випускається вагонобудівними заводами. Крім того, отримана модель дозволяє здійснювати оперативний контроль економічної ефективності машинобудівної галузі при різних цінових змінах на світовому ринку. **Наукова новизна.** Набула подальшого розвитку модель, яка описує показник економічної ефективності продукції, що випускається вагонобудівними заводами в умовах динамічного ціноутворення при диверсифікації машинобудівного виробництва. **Практична значимість.** Дана модель дозволяє проводити оперативний контроль економічної ефективності машинобудівної галузі при різних цінових змінах на світовому ринку.

*Ключові слова:* рентабельність, динамічне ціноутворення, вагонобудівний завод, економічна ефективність

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