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TECHNICAL DEVELOPMENT OF MANUFACTURING AS A STRATEGIC INSTRUMENT FOR IMPROVING THE EFFICIENCY OF A MOTOR TRANSPORT ENTERPRISE

BY

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Abstract: The paper considers the issue of implementing the technical development for increasing the motor transport enterprises' efficiency. There had been determined the typical strategies of production development for complex motor transport enterprises as well as their feature and feasibilities had been analyzed.

Keywords: motor transport enterprise; technical development; strategy; rolling stock; production and technical base.

1. Urgency of an Issue

The main objective of any enterprise is the maximum profit from its activity. The complex motor transport enterprises (MTE) are not the exceptions, the main goal of which is to receive profit by rendering services on trucking activities. The contemporary state of some MTE however does not enable them function efficiently and receive profit under the conditions of competing environment due to some reasons.

One of the reasons is the significant aging of the production facilities, especially their active part – the rolling stock. Depriciated and morally aged

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rolling stock cannot compete with the modern samples of car industry, especially with the foreign one. Besides, the modern manufacturing and the logistic network set forth the new conditions to the rolling stock, which may make the use of these cars inappropriate, therefore, the modern cars for long distance traffic differ from cars which operate as the distribution vehicle in the cities.

This is necessary to note that for the complex MTE, that is, those, which maintain the operable state of the cars, the structure and the state of the passive part of the production facilities, production and technical facilities (PTF) also influence the traffic handling costs, and, consequently, the efficiency of the MTE itself. The modern PTF in the majority of MTE, as well as the rolling stock, is in unsatisfactory state due to its wearing out and aging of the technological processes on maintenance operations (MO) and car repair.

Thus, one of the ways to improve the efficiency and competitiveness of the modern MTE is the technical development, that is the complex renovation of both, rolling stock and PTF on the base of system approach, determined by close connections between the rolling stock and PTF. For example, the change of the car park for the modern samples, which by their design and MO technology differ from those available on MTE, require the improvement of PTF, which needs the additional funds for the PTF development and, correspondingly, influences the final economic effect from the renovation of the rolling stock.

2. Analysis of Scientific Works

The scientific works pay very little attention to the issue of the development the motor transport enterprises on the system approach. Most of the scientific works consider the question of the rolling stock renewal and the PTF development as “almost” independent from each other, that is, without examining their relationships in complex renewal. Therefore, it is worth noting the following outstanding national and foreign scholars, such as G.F. Babushkin, M.N. Budnyak, V.N. Varfolomeyev, M.Y. Govorushchenko, V.E. Kanarchuk, E.S. Kuznetsov, I.P. Kurnikov, O.A. Ludchenko and many other scholars who works on these issues.

But many of these works are based on a planned economy’s principles, which operated in the USSR, that rather complicates their use under market conditions prevailing in modern Ukraine. Therefore, among the contemporary works that consider this issue under market conditions, it is necessary to emphasize the work (Bidnyak, 2000) that studies the economical aspects of the MTE’s rolling stock renewal. In addition, the works (Radonova, 2001; Mazorchuk, 2003) on industrial enterprises’ technical development should be highlighted, however, considering the automotive industry’s specificity, these works have a limited use.

3. Problem Statement

The technical development of motor transport enterprises requires a strategic planning, *i.e.* building up technical development strategies. Strategic planning enables business leaders to determine the direction and pace of business development, determine the global market trends, understand what organizational and structural changes must occur at the enterprise to make it competitive, understand its advantages and what tools are necessary for its successful development (Ansoff, 1989).

The technical development strategy is a complex and potentially powerful mechanism that can allow motor transport enterprises to resist changes in the external environment and sustain the competition in the transport services market. However, the strategies' mechanism of technological development, as a perspective managing the MTE's development, today is little-invesigated. This requires the development of modern methods for determining the effective strategies for technological development and research of the practical aspects of their implementation.

4. The Main Part

The use of strategic approach requires a perspective on the company in terms of "an open" system , the major preconditions of which are not in the middle, but outside the system. Apparently, the performance of the operating company depends on how effectively it can adapt to the market. MTE, that operates on a specific transport market (or segment) will meet the requirements of the market if it provides transportation services, depending on the market potential and certain transportation costs (both services are competitive, and traffic volumes will provide the expected profit) (Bilichenko, 2006; Smirnov, 2010). Therefore, while choosing a strategy for technological development, one should be guided either by the potential profits from the strategy or the data on the market share, which the company can take , considering the company's internal structure and competitors productivity.

The strategy realization shall be considered as a certain set of organizational and technical measures put into life to achieve the goals and objectives having been regarded before. The set of measures for implementing the strategy comprises a combination of renewed rolling stock and the development of PTF and, accordingly, it may include the following options:

a) simple replenishment of the car park that requires the modernization of the existing PTF;

b) simple replenishment of the car park that requires technical re-equipment of the existing PTF;

c) simple replenishment of the car park that requires the reconstruction of the existing PTF;

d) complex replenishment of the car park that requires the modernization of the existing PTF;

e) complex replenishment of the car park that requires technical renovation of the existing PTF;

f) complex replenishment of the car park that requires reconstruction of the existing PTF;

g) identical replacement of the rolling stock that requires the modernization of the existing PTF;

h) identical replacement of the rolling stock requires technical upgrading of the existing PTF;

i) identical replacement of the rolling stock that requires the reconstruction of the existing PTF;

j) modernization of the rolling stock that requires upgrading of existing VTB;

k) modernization of the rolling stock that requires technical upgrading of the existing PTF;

l) modernization of the rolling stock that requires the reconstruction of the existing PTF.

Additionally, for each strategy there may be offered several options for its implementation, that will differ from each other in the way of using various rolling stock. Considering the above, the amount of the initial investment required for the implementation of the *i*-th alternative of the technical development shall be determined by the formula

$$\mathrm{IC}_i = \sum_j \mathrm{IC}_{ij}^{\mathrm{RS}} + \sum_j \mathrm{IC}_{ij}^{\mathrm{PTB}}, \qquad (1)$$

where $\mathrm{IC}_{ij}^{\mathrm{RS}}$ is the initial investment required to purchase the *j*-th type of rolling stock at the *i*-th option; $\mathrm{IC}_{ij}^{\mathrm{PTB}}$ – the initial investment required for the development of the company's industrial and technological base the for the *j*-th type of rolling stock at the *i*-th option.

Strategies for technical development, providing easy replenishment of the park make sense when the operating at the enterprise rolling stock is modern enough, or the rolling stock meets at least the requirements to freighting, and the capacity of the existing rolling stock is insufficient for meet the existing demand for transport services market. In this case, there will be no differences between the existing rolling stock and vehicles that are to be purchased once. However, the existing capacity of PTF may be insufficient to provide the maintenance for the rolling stock on condition of a significant increase in the

number of cars. It may therefore be necessary to modernize it, renovate all the facilities that will lead to the existing production equipment refurbishment and productive patterns improvement, or even reconstruction of the enterprise, due to the need of construction of new stations or reconstruction of the existing. Under these circumstances the last two strategies in this group may be inexpedient due to the need of attracting the substantial funds for the development of PTF.

Strategies for technical development, providing for the complex (extended) replenishment of the park stipulates for the purchase of new cars that have never been used by this enterprise. The purchase of new cars is due to the availability of the market share, which the company is trying to capture. Moreover, new cars can meet the requirements for transportation more substantially and, in turn, be more effective compared to the existing ones . Depending on the degree of differences between the new cars and the available motor-vehicles and the capacity of the existing PTF there might be necessary to upgrade, modernize or reconstruct the latter.

Strategies for technological development, providing identical replacement of the rolling stock can be implemented only once the company takes a definite market share in transportation services and is active against competing users. In this case, the aged rolling stock will be ineffective, although it fits the traffic profile. The purchase of new cars that will not differ structurally from the existing ones, (but their effectiveness will be considerably higher), is required to succeed. One may need to upgrade or revamp the PTF with the purchase of new cars. Under these conditions the reconstruction may take place but hereby its effectiveness is questionable because of the need to attract much money.

Strategies for technological development, that envisage the upgrading of rolling stock, are used in terms of replacement of old and inefficient rolling stock for new models, which totally meet the requirements of traffic. In this case, a new rolling stock may differ from the existing one significantly. There are the strategies, the implementation of which involve both, PTF upgrading and reconstruction, depending on the degree of difference between the new and the used cars. Usually, PTF modernization will be unlikely in this group of strategies, since it is assumed to purchase cars different from the existing ones.

The source of strategies' cost-effectiveness for technological development is increasing in traffic revenue due to the use of the new, more efficient rolling stock as well as the optimization of the PTF structure. This will result in provision of the required level of the performance of the maintenance and repair of motor vehicles while reducing the cost of the work. To evaluate the economic impact from the implementation of this or that technical plan of development , it is worth using the indicators of the payback period , net present value and internal rate of return (Bidnyak, 2000; Radonova, 2001; Mazorchuk, 2003; Ansoff, 1989; Bilichenko, 2006; Smirnov, 2010; Bilichenko, 2009):

$$\mathrm{PBP} = \frac{\mathrm{IC}}{\sum_t \mathrm{CF}_t / T}, \tag{2}$$

$$\mathrm{NPV} = \sum_{t=1}^{T} \frac{\mathrm{CF}_t}{(1+r)^t} - \mathrm{IC}, \tag{3}$$

$$\sum_{t=1}^{T} \frac{\mathrm{CF}_t}{(1+\mathrm{IRR})^t} - \mathrm{IC} = 0, \tag{4}$$

where: PBP is the pay-back period of the variant, years; IC – invested capital, [$]; T – the term of the variant, years; CF_t – the cash flow from the realization of the variant in the t-th period, [year]; r – the discount rate for the lifetime of the variant; NPV – the net present value, [$]; IRR – the internal rate of return.

Options for which at least one of the following three conditions will not come true shall be considered as economically feasible:

1) the pay-back period is larger than the term of the variant: PBP > T;

2) the net present value NPV ≤ 0;

3) the internal rate of return is lower than the minimum acceptable rate of return: IRR < MARR.

Besides, the implementation of technological development strategies allows the company to strengthen its position on the market of transport services and improve its competitiveness. Primarily, this can be achieved by the selection and use of a constructively new and more specialized rolling stock which is better adapted to the transportation conditions. Furthermore, new cars have lower maintenance costs, that allows the company to pursue a more aggressive tariff policy.

Strategies, the implementation of which involves the purchase of new cars, which differ significantly from the available car park, usually require the development of PTF, that is associated with the attraction of sufficiant funds. That's why these strategies are more capital-intensive (see eq. (1)), and therefore their use will be expedient if the efficiency of new cars exceeds the performance of existing car fleet significantly or the cars being purchased for the other purposes and spend less on PTF. That is, even at much higher efficiency of new cars can be a situation where the final effect of the strategy is not worth the initial investment.

The company ought to attract additional funds from external sources (loans, leasing, emission of securities, IPO, etc.) that have their value as well as availability, since the implementation of technological development strategies corresponds to additional investments with quite high cash flow. Therefore, when developing the overall effectiveness such an issue must be considered.

In addition to the economic benefits, the implementation strategies of technological development accepts several other consequences such as improving the working conditions for drivers through the use of new vehicles equipped with systems that help the driver, improving conditions and encouraging the workers productivity by renovating PTF, bringing the clients satisfaction by improving their quality, increasing its credibility on the transport market.

5. Conclusions

Taking into account the current state of road transport Ukraine it is possible to assert that the technical development of production is one of the most appropriate ways to increase the efficiency of complex motor transport enterprises. Considering the specificity of technological development, its implementation on the motor transport enterprise requires a strategic approach. The implementation of the technological development strategies usually involves the renewal of the enterprises' system – i.e. the renewal of both the rolling stock and the PTF n complex. Due to this, there had been determined the typical strategies of technical development that are based on simultaneous renewal of the rolling stock and the operational and technical base as well as their characteristics and feasibility had been analyzed.

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DEZVOLTAREA TEHNICILOR DE PRELUCRARE CA INSTRUMENT STRATEGIC PENTRU ÎMBUNĂTĂȚIREA EFICIEȚEI UNEI ÎNTREPRINDERI DE TRANSPORT

(Rezumat)

Se abordează chestiunea implementării progresului tehnic pentru creşterea eficienței unei întreprinderi transport. S-au determinate strategii tipice de dezvoltare pentru intreprinderi complexe de transport motorizat şi s-au analizat fezabilitatea acestora precum şi perspectivele.