V. V. Bilichenko, Cand. Sc. (Eng)., Assistant Professor.; E. V. Smyrnov

DETERMINATION OF EFFICIENCY OF PROJECTS OF TECHNICAL DEVELOPMENT OF AN ENTERPRIZE ON AUTOMOBILE TRANSPORT

The paper considers the problem of determination of efficiency of strategies of technical development of an enterprise and corresponding projects for their realization. There had been substantiated the criteria for determination of economic efficiency of projects and evaluation of competitiveness of automobile transport enterprise. There had been suggested an algorithm for determination of efficiency of projects for technical development of an enterprise on the automobile transport.

Key words: *automobile transport enterprise, technical development, strategy, project, economic efficiency, competitiveness.*

Transition of Ukraine to the market mechanisms in economy brought the automobile transport enterprises new possibilities as well as problems. Thus, every enterprises were free to manage their activity, distribute income on their own, change profile and structure of transportations etc. Along with that there was the formation of markets for transport services, on which unlike in command economy, an enterprise has to look for customers and compete with other enterprises on the market on its own.

In conditions of rigid competition many autotransport enterprises became low income or even loosing ones. The main reason for it was economic crisis of 90s in XX century, in result of which administration of enterprises, striving to survive, made many strategically unwise decisions, namely, selling off rolling stock, manufacturing areas, declining speed or total reject from renewal of main manufacturing fund, reducing number of skilled workers etc. The above caused the situation when the aged and worn out rolling stock, which remained on enterprises, could no longer compete with modern automobiles.

One way to overcome this difficulty is technical development of enterprise, which stipulates for renewal of basic manufacturing funds of an enterprise, namely, its active and passive parts, considering inner connections, which are available between the subsystems. Technical development of an enterprise is an element of strategic planning of enterprise activity, realization of which usually stipulates for attracting additional investments, results of which shall be achieved in a period of time, usually some years. Therefore the enterprise of automobile transport in the process of development and substantiating strategies for technical development faces the problem of determination of efficiency of technical of introduction of corresponding projects of technical development, stipulated for by the given strategies.

Most of scientific papers dedicated to the problem of evaluation of capital investments on automobile transport are not actual since they are based on the backgrounding of command economy, and cannot be applied under market conditions. The common drawback of such works is the fact that during determination of efficiency of capital investments, their efficiency criteria is based on minimization of operating costs, consequently, they do not consider income of an enterprise which, under market conditions, is the ground for efficient operation of an enterprise. Among the contemporary researches it is necessary to emphasize work [1] written by M. N. Biedmiak and N. M. Boundar, who considered the process of determination economic efficiency of investments on automobile transport in details. The paper however does not consider the question of competitiveness of autotransport enterprise. The final profit from the realization of the project depends directly on the possibility to execute the volume of transporting works, which is stipulated for during strategy development. During the Soviet Union time, the volumes of transportation where set upon the directives by command economy principles, which did not require to search for its place on the market of transport services, but transition to the market relations means that the enterprise must “win” the necessary volumes of transportations to receive income at the cost of competitive and efficient tariff.

Thus, the objective of this work is to determine efficiency criteria of the projects of technical

development of manufacturing process on automobile transport, which must consider both, the evaluation of economic efficiency of investments attracting, and evaluation of enterprises place on the market together with its competitiveness, since the aggregate of the factors determine the total efficiency of the project.

The world practice widely uses methods of recoupment, return as for the invested capital and discounting of money flows [1 - 3] for evaluation of efficiency of investment projects on transport.

Method of recoupment stipulates for determination of temporary period (period of recoupment), that is, period, in the end of which the sum of money inflow becomes equal to the sum of initial investments:

$$T_{OK} = \frac{НИ}{\sum_t ДП_t / T}, \quad (1)$$

where $НИ$ – initial investments, UA Hr.; $ДП_t$ – money flows from project realization in the t – th period, UA Hr.; T – period for project realization, years.

It is necessary to note that from the point of view of commercial efficiency, money flows must include [2, 3]:

– expenditures on purchasing (constructing) main manufacturing funds, increase (release) circulating assets etc.;

– income from rendering services, other income and spending on non – manufacturing activity, operational expenditures without amortization costs, taxis and other payment etc;

– long term and short term credits, meeting of liabilities and interest rate on credits and debt evidences etc.

The drawback of the recoupment method in the fact that during the calculation of the recoupment period the changes of money value is not taken into account, and the method does not reflect the level of project profitability after period of recoupment. Thus, during the development it may be used as the factor of winnowing out, when the period of recoupment must be less than the planning period for project realization:

$$T_{rec} < T_{proj}, \quad (2)$$

where T_{proj} – planning period for project realization, years.

Method of return as for the invested capital stipulates for the determination of income, activities of which is profitability, with further comparison of these activities with previously fixed planning level. The major drawback of this method is a fact it is based not on money flows but on accounting income, thus, not considering distribution of inflow and outflow of capital within time.

Methods of discounting of money flows are currently the most scientific and are widely used in the world economic practice. These methods are based on determination of value of future money flows, brought to the cost of initial investments with fixed rate of discounting.

Methods of net value [2 – 6], index of profitability and internal rate of profitability are the most widely used among discounting methods.

Net current value of the project (net discount income, net present value) – factor, which shows how total effect from project realization, brought to the current (initial) moment of time (real cost of future money flows) exceeds value of investments, also brought to this of time.

If we assume that the investments are attracted only in the initial moment, the net cost of the project (NCP) will be written as follows:

$$ЧТС = ТС - НИ, \quad (3)$$

where $ТС$ – current cost of future money flows;

$$ТС = \sum_{t=1}^{T} \frac{ДП_t}{(1+r)^t}, \quad (4)$$

where r – rate of discount within project realization.

If value $ЧТС \geq 0$, the project ensures necessary (or big) norm of income of capital and is efficient. Selection criteria will be maximum value of net current value of project since it determines the size of capital increase of an enterprise (investor).

Index of capital return (index of profitability) is determined as the relation of the current cost of future money flows to the initial investments:

$$ИД = \frac{ТС}{НИ}. \quad (5)$$

If $ИД \geq 1$, the project is approved, in other case the project is declined.

This index as a matter of fact is very close to net current cost and reflects the difference between the index of current costs of future money flow and value of initial investments, disregarding the scale of the project.

Internal Rate Return (IRR) is the measure of profitability of the project and determined as the discount rate, with which the total effect from project realization equals the initial investments.

Internal Rate Return is determined by the solution of the following equation relating to *ВСД*:

$$\sum_{t=1}^{T} \frac{ДП_t}{(1+ВСД)^t} - НИ = 0. \quad (6)$$

Following this index the project is considered to be efficient if the internal return rate will be not less than the necessary income rate, fixed by enterprise (investor) for this investment project depending on volume of investments and risk, that is:

$$ВСД \geq НСД, \quad (7)$$

where *НСД* – necessary income rate.

Method of internal return rate however suffers drawback since it is, like other methods, based on income rate, does not take into account the sizes of the project, consequently, does not take into account the index of increase of the own capital of the enterprise (investor).

Having considered the above methods for evaluating efficiency of the investment projects, it of possible to draw a conclusion that all the methods suffer specific drawbacks, therefore it is impossible to single out any specific criterion, which leads to multy – criterion approach in the determination of economic efficiency of the projects of technical development of an enterprize.

In comparison with method of recoupment term, discounting methods have number of advantages since they consider money flows but not income from project realization and consider sensitivity of money to the change of their value in time.

In view of this we will use three criteria – term of recoupment, net current cost and inner rate of income to evaluate the efficiency of projects for enterprise technical development.

Nevertheless, indexes *ЧТС*, *ВСД*, *НИ*, during the determination of economic effect from the introduction of project of technical development fixe in the calculations the volumes of transportation, to be fulfilled in total capacity to ensure the calculation indexes. That is, if the future volumes of transportations will be less then those forecast by value exceeding the allowed values of

prognostication, such a project will not ensure the calculative values of economic indexes.

Thus, one more very important thing during project evaluation is ensuring by an enterprise the necessary volumes of transport services. Ensuring the efficiency of the project of technical development requires first of all the situation when the forecast market volumes of transportation, as for the k – the time become less than the calculating volumes of transportations following this strategy, that is

$$D_k^{forc} \geq D_k^{calc}, \tag{8}$$

where D_k^{forc} – prognozed volumes of enterprise transportation as for k-th kind of transportation; D_k^{calc} – calculating volumes of transportation of an enterprise as for calculated k-th kind of transportation , which are used during the calculation of strategy efficiency. For determination of the forecast volumes of transportation the authors think it is expedient to use the factors of market situation and enterprise's competitiveness. The leading western economist [7, 8] had developed number of system factors for the determination of market situation and enterprise's competitiveness on condition of strategic planning. As for the automobile transport, the [9, 10] present pretty thorough analysis of factors of market situation and for evaluation of projects of technical development the authors suggest to use the following factors

1. The occupied (absolute) market share:

$$C_1(t) = \frac{P(t)}{P^r(t)}, \tag{9}$$

where $P(t)$ – volume of transportations done by the enterprise in the t-th period; $P^r(t)$ – total volume of transportations, done on the market of transport service within the same period.

2. Relative market share:

$$C_2(t) = \frac{P(t)}{P^k(t)}, \tag{10}$$

where $P(t)$ – volume of transportations done by the enterprise in the t-th period; $P^k(t)$ – volume of transportations, done by the enterprise with leading position on the market.

3. Relative quality of services:

$$C_3(t) = \frac{q(t)}{q^k(t)}, \tag{11}$$

where $q(t)$ and $q^k(t)$ – integral factors of quality services of the considered enterprise and company with leading position on the market correspondingly.

Group of the factors $C_1(t)$, $C_2(t)$, $C_3(t)$ allows to evaluate the future place the autotransport enterprise and a company on the market, determinining at the same time the demand for transport services and distribution of values of transportation between player on the market. In this diagram the index $C_3(t)$ characterized influence of improvement of quality of transport services on distribution of total demand on the market.Hence in conditions of autotransport enterprises the using of this index is appropriate only for passeger transportation since only only under these conditions the transportating quality will determine the demand on the tariff level.

So, determination of the most efficient project of technical development is suggested to be fulfilled during two stages. First, using indexes of market share, winnow out projects which do not

exceed the competitiveness of the enterprise with further final choice of this or that variant using complex of efficiency criteria. The order of comparison and decision making on strategy of technical development is presented in the kind of block diagram on fig 1.

Determination of efficiency of projects of technical development is done in the following succession.

Determination of enterprise's competitiveness factors shown in formulas (9) – (11) takes place in block 1. If the competitiveness of an enterprise increases, the project of technical development shall be accepted for further consideration and control goes over to block 3, otherwise the project shall be declined (block 2).

Due to the special indexes of competitiveness and tendences for market development in the sphere of transport services, block 3 determines the prognosticated volumes of transportations based on real demand on transport services. If prognosticated transportations volumes are lower then those transportations volume fixed during the economic and mathematical simulation of the project (see equation (8)), this project is considered to be possible and accepted for further consideration, pn other case it is considered as impossible and declined.

Blocks 5,7 and 9 determine the indexes of economic efficiency of projects of technical development, namely, period of recoupment , net current cost and internal income rate. The projects which do not meet economic criteria are being declined (see depends (1) - (7)). Thus, block 5 winnows out project, period of recoupment of which exceeds period of project realization. Block 7 winnows out project with negative net current cost, and in block 9 – internal income rate of which is lower then the necessary one.

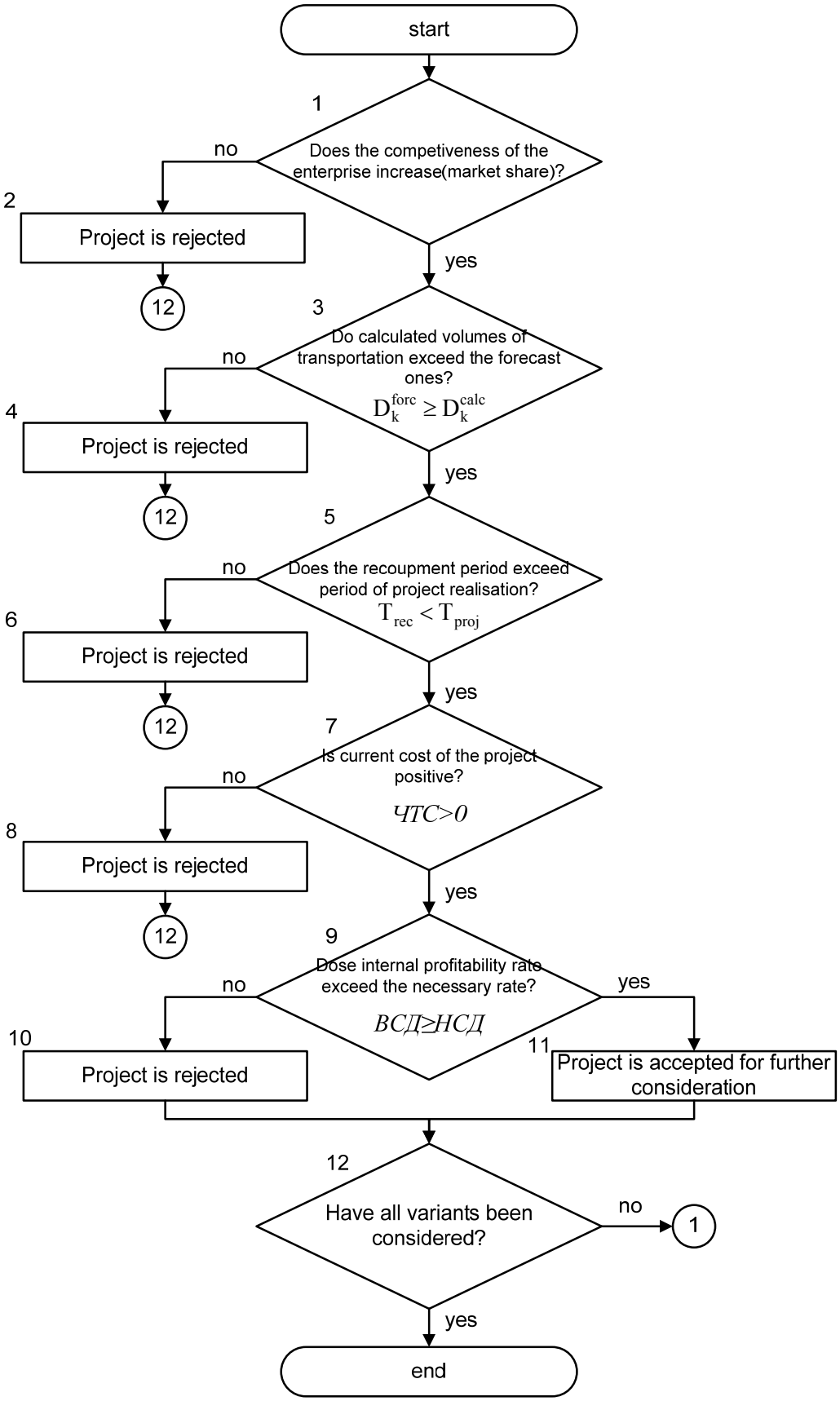

Fig. 1. Algorithm for determination of efficiency of projects of technical development of manufacturing

Projects, meeting all criteria of efficiency, go to block 11, where the mass of initial data shall be formed from the absolute values of economic indexes of projects further sent to the administration (investors) for determination of the most appropriaye Final decision as for project approval must be made by expert way based upon evaluations, values of *ЧТС*, *ВСД*, $T_{ОК}$, *НИ*,taking into account risk and external limitations which influence the possibility of enterprise's operation.

Block 12 checks wethere all variants had been considered, that is, all the projects as for the strategy of technical development.

Conclusions. During the development and backgrounding of starategies for technical development of manufacturing the autotransport enterprises face the problem of evaluation of efficiencyof projects of realization of these strategies under modern conditions of economy since the majority of the existing indexes are old and do not meet market conditions. On our opinion, the evaluation of the efficiency of projects for technical development requires the usage of two groups criteria, one of which stipulates for evaluation of economic efficiency of the project and includes indexes of recoupment period, net current cost and internal income rate, and the second – estimation of competitiveness of an enterprise during the project implementation, based on determination of indexes of market share. The paper suggested also algorithm of projects for technical development of enterprise.

REFERENCES

1. Бідняк М. Н. Планування інвестицій на автомобільному транспорті України / М. Н. Бідняк, Н. М. Бондар. – К.: Б. В., 2000. – 118 с.

2. Волков Б. А. Экономическая эффективность инвестиций на железнодорожном транспорте в условиях рынка / Б. А. Волков. – М.: Транспорт, 1996. – 191 с.

3. Методы экономической оценки инвестиционных проектов на транспорте: [учеб.-метод. пособие] / Сост. Ю. Ф. Кулаев. – К.: Транспорт України, 2001. – 182 с. – ISBN 966-7737-10-1.

4. Бланк И. А. Инвестиционный менеджмент / И. А. Бланк. – К.: МП "ИТЕМ" ЛТД, 1995. – 448 с. – ISBN 5-7707-6904-1.

5. Идрисов А. Б. Планирование и анализ эффективности инвестиций / А. Б. Идрисов. – М.: PRO-INVEST CONSALTING, 1995. – 160 с.

6. Ковалев В. В. Методы оценки инвестиционных проектов / В. В. Ковалев. – М.: Финансы и статистика, 2001. – 144 с. – ISBN 5-279-01871-6.

7. Портер М. Конкурентная стратегия. Методика анализа отраслей и конкурентов / Майкл Портер, [2-е изд.]. – М.: АльпинаБизнесБукс, 2006. – 454 с.

8. Normann R. Service management / R. Norman. – Sweeden, 1983. – 124 с.

9. Біліченко В. В. Показники конкурентної ситуації автотранспортних підприємств при розробці проектів технічного розвитку виробництва / В. В. Біліченко, Є. В. Смирнов, С. В. Цимбал // Вісник Східноукраїнського національного університету ім. Володимира Даля. – 2007. – №6 (112). – С. 56 - 59.

10. Бідняк М. Н. Виробничі системи на транспорті: теорія і практика / М. Н. Бідняк, В. В. Біліченко. – Вінниця: УНІВЕРСУМ-Вінниця, 2006. – 176 с. – ISBN 966-641-200-4.

Bilichenko Victor – Head of Department of Automobile and Transport Management;

Smyrnov Yevgen – Assistant with the Department of Automobile and Transport Management.
Vinnytsia National Technical University