

VALUATION OF ECONOMIC EFFICIENCY OF USING VEHICLES IN INTERNATIONAL TRANSPORTATION OF CARGOES

Andrei Kosovsky, Aleksander Zubritsky, Tereza Kisel

Belarusian National Technical University, Belarus

Export of services has strategic value for the Republic of Belarus which is not possessing essential stocks of natural resources. motor transportation services has considerable place in it and particular, international transportation. So, receipts of foreign currency from this kind of activity make annually about 400 million US dollars.

However now the potential of growth of national export of motor transportation services practically is not realised. Last years in national sphere of the international autotransportations negative tendencies are observed. So, for 2003-2006 according to the Belarus association of the international automobile carriers (BAMAP), it is taken out for republic limits (to the Russian Federation, Lithuania, Poland, Ukraine, etc.) about 40 % of park of a rolling stock of the national transport companies occupied on the international automobile transportations of cargoes. And in spite of the fact that mass export in 2007 – does not occur 2003, the rolling stock is updated by the lowest rates, i.e. continues to grow old.

The decision of the given problem can be carried out at the expense of acquisition of new cars of family "MAZ". However, the national businessmen operating in sphere of the international autotransportations do not want to buy the given vehicles (automatic telephone exchange). This results from the fact that vehicles of mark MAZ lag behind import analogues on quality, reliability and durability, though their cost below foreign analogues. Thus in connection with high, according to carriers, the customs duties, acquisition of an import rolling stock also is carried out by the lowest rates. Therefore for the balanced state regulation of the national market of vehicle for the international cargo autotransportations, considering interests, both national carriers, and the home producer, it is necessary to estimate from scientific positions efficiency of use both national, and the foreign cars occupied with international transportation.

The toolkit allowing unequivocally to estimate level of economic efficiency of use of certain mark of vehicle is necessary for object in view realisation. The technique of a mark of economic efficiency of use of vehicle developed on his basis should provide correctness of application of the given toolkit at performance of international transportation of cargoes in which basis it is necessary to put following principles:

– **Scientific character.** The given principle means use of only conventional scientific categories and the concepts deduced from them under laws logicians of derivative concepts. In research application of the data of the state statistical reporting (for the international transport – the form №1-tr (TIR-CARNET)) and the data possessing property of a representativeness is supposed only.

– **Practical applicability.** Realisation of the given principle should provide achievement of the purpose of application of the developed technique.

– **Comparability of results of research.** Application of the given principle means research only influences of parametres of certain mark of vehicle on economic efficiency of his use on international transportation of cargoes at an assumption "with other things being equal" – operation given to vehicle "an average" national carrier which function in conditions of macroenvironment identical with another carriers (external forces). Thus, for a mark of economic efficiency of use of vehicle on international transportation of cargoes it is necessary to simulate averages on republic and conditions of commercial operation identical to all automatic telephone exchanges, i.e. the quantity of cargo transported for one run (q_F), run operating ratio (β) and etc. Application of the given principle provides comparability of service conditions of automatic telephone exchange.

– **Uniqueness and unambiguity of criterion of a mark.** Realisation of the given principle means use of unique integrated criterion of the mark in a complex estimating all aspects of operation of vehicle on international transportation of cargoes.

Conformity of expenses and result of economic activities to her subject. Realisation of the given principle means that the mark of economic efficiency of use of vehicle in sphere of international transportation of cargoes should be made from the point of view of the businessman (the physical or legal person), carrying out the international automobile transportations with use of the given rolling stock. The given principle is caused by that the basic function of use of vehicle is manufacture of transport service with certain parametres (including cost, the cost price, the income of her realisation and etc.) . The businessman as the person the making decision on acquisition and vehicle use, estimates efficiency of his use from a position of a parity of expenses of economic resources in connection with his actions on the organisation of the international automobile transportations and economic results from the given expenses. Thus, the purposes of a technique do not assume a mark of economic efficiency of use of concrete mark of vehicle on international transportation for a society as a whole.

Application of the above-named principles creates a basis for an objective mark of economic efficiency of use by the Belarus carriers of certain mark of vehicle in sphere of international transportation of cargoes.

Technique basic point is that circumstance that from the point of view of the businessman of sphere of the international automobile transportations of cargoes acquisition of vehicle for his operation on the international routes is an investment of investments into the given field of activity for the purpose of profit reception. The given circumstance is caused by that for today in national sphere of the international automobile transportations the enterprise structures based on the private capital function, the basic which motive of activity is reception of the maximum profit on the invested capital. Thus, the mark of economic efficiency of use of vehicle at performance of international transportation should be made in the form of a mark of economic efficiency of investments. Thus, as technique-operational properties of vehicle for all term of his operation on the international autotransportations of cargoes (about 7 years) considerably change (worsen), the mark of economic efficiency of investments in a rolling stock should be made by dynamic methods. It is necessary to notice that businessmen of sphere of international transportation of cargoes make the given estimation intuitively.

The analysis of works on a problem of a mark of economic efficiency of operation of vehicle [1, 2] allows to ascertain that researchers of the given problem consider in the greatest measure to corresponding purposes of a mark following two indicators:

- Pure current cost NPV (Net Present Value);
- Internal norm of profitability IRR (Internal Rate of Return).

Thus researchers of the given problem give a priority to an indicator of pure current cost which represents cost of the discounted net profit for the settlement period and is absolute pure size. For the purposes of our research the form of an indicator of internal norm of profitability as from the aforesaid follows more approaches that businessmen of sphere of international transportation of cargoes make a mark of economic efficiency of use of vehicle s on the international lines in the form of profitableness of investments concerning alternative variants of use of the capital of the given investments. On economic sense the internal norm of profitability just also reflects profitableness of investments as shows rate of a gain of the capital of the investments, inherent in the given investment project. In favour of application of the given indicator says also that fact that in the conditions of shortage of financial resources in which the Belarus carriers function now, rate of a gain of their capital acts for them as the main measure of economic efficiency of his investment. Thus feature of application of the given indicator for the purpose of a mark of level of economic efficiency of use of certain mark of the vehicle on the international lines is that streams of incomes and expenses should pay off from this assumptions that the given vehicle is maintained by an "average" national carrier in average conditions of their work in the international market of motor transportation services (see the principle of comparability of results of research), i.e. the actual investment project, and conditional is investigated not. Therefore it is necessary to talk about average internal norm of profitability AIRR (Average internal rate of return). Thus, as criterion of a mark it is offered to apply an integrated indicator of a mark of economic efficiency of acquisition and rolling

stock operation on international transportation of cargoes – average internal norm of profitability which pays off consecutive approach proceeding from the formula (figure 1):

$$E_0 - \sum_{t=1}^{t=T_3} \frac{(I_t - E_t)}{(1 + \frac{AIRR}{100})^t} = 0, \quad (1)$$

Where E_0 - the price of the new vehicle of the given mark, c.u.;

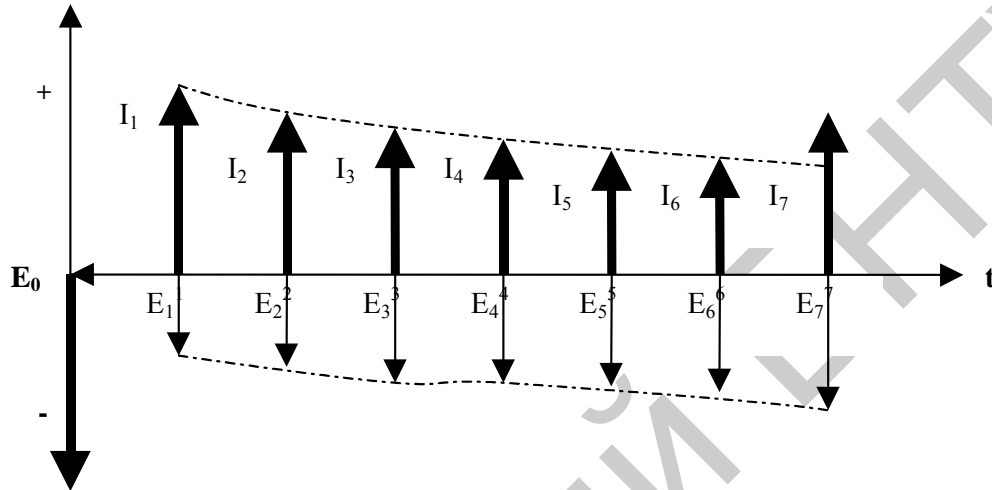


Figure 1: Streams of incomes and expenses from vehicle operation

- Incomes of vehicle operation in t-th year, c.u.;
- Expenses on vehicle operation in t-th year, c.u.;
- Term of operation of the vehicle on the international lines.

It is necessary to notice that includes the hypothetical income of vehicle sale at residual cost. From the formula (1) it is visible that on economic sense the average internal norm of profitability is rate of a gain of the capital in the form of investments into the vehicle of concrete mark for term for his operation in sphere of international transportation of cargoes.

Apparently from drawing 1 incomes of operation of any vehicle will fall eventually, and expenses to increase. It is connected by that at vehicle operation will stand idle eventually more under technical influences – operating repair and the maintenance service made by costs of those is the half-received income as that time, which vehicle stands idle under technical influences, could be used for manufacture of motor transportation services. In research the hypothesis stated by representatives of national sphere of export of motor transportation services, that certain losses of the income at operation of vehicle s of family MAZ will be connected by that the given vehicle s approximately on one ton is heavier than import analogue, and, hence, has not proved to be true the given vehicle hypothetically will transport on one ton of cargo less. So under the form 1-tr (TIR-CARNET) the average quantity of cargo transported for run for 2008 makes tons that is essential less than nominal load-carrying capacity of tractor MAZ in a hitch with the semitrailer.

Growth of expenses on operation of vehicle s basically is connected with growth of expenses for technical operation (maintenance service and operating repair). Thus it is necessary to notice that at growth of breakages of vehicle s on a line the motor transportation enterprises bear the expenses connected with arrival on HUNDRED, by necessity of a call of the tractor and towage of the car, a cargo overload in other vehicle, because of cargo nondelivery in time and etc. Growth of expenses at operation of cars of family MAZ will be connected by penalties also with the big expenses for restoration of transport process in connection with backwardness of a network of service of the given vehicle s in countries of Western Europe. In research it is offered to abstract from influence of technical properties of

vehicle s , such as ergonomics, brake properties and etc. On efficiency of his use as the given influence is carried out only indirectly and essentially depends on psychophysiological properties of the driver – weariness, discipline, responsibility, working capacity and etc.

After a mark of incomes and expenses from vehicle operation, and also his residual cost in the end of operation term on the international lines calculation of indicator AIRR at use of concrete mark of the vehicle in sphere of international transportation of cargoes is made. Use of indicator AIRR as criterion of economic efficiency of use of certain mark of the vehicle national carriers assumes his comparison with the guaranteed rate of increase of the capital in which quality it is possible to accept average on republic the interest rate of commercial banks under the deposit. At a parity (2) use of the given vehicle in sphere of international transportation of cargoes is economically effective for national carriers.

$$AIRR > i_0 \quad (2)$$

At a parity use given to vehicle in sphere of international transportation of cargoes is economically inefficient as capital investments of investments into bank will give *больший* the guaranteed rate of increase of the capital for national carriers.

The sequence of actions at a mark of economic efficiency of use of certain mark of vehicle the Belarus carriers on international transportation of cargoes is presented in drawing by 2 algorithm of a technique of a mark of economic efficiency of use of vehicle of national and foreign manufacture at international transportation of cargoes. On the first step the mark of typical service conditions of vehicle is made by national carriers: average quantity of the cargo transported for *ездку* $q\phi$ average speed of message V_c , average time for loading-unloading for *ездку* $tr-r$, average operating ratio of run β and etc. On the second step time parametre t and term of operation of vehicle on the international lines of T_e is set. On the third step calculation of time parametres of operation of vehicle for t th year is made:

- The Car-days of run with cargo for t th year;
- The Car-days of run without cargo for t th year;
- The idle time Car-days under loading-unloading for t th year;
- The idle time Car-days under maintenance service and operating repair for t th year;
- The idle time Car-days for the organizational reasons for t th year.

On the fourth step calculation of incomes I_t and expenses E_t for t -th year is made. On the fifth step the net profit for t -th year NI_t pays off. On the sixth step comparison of parametre of time t and term of operation of vehicle on the international routes of T_3 is made. If $t < T_3$ to time parametre t value t is appropriated: $t = t+1$ transition to a step 3 algorithms also is carried out. If time parametre $t = T_3$ transition to a step 7 algorithms is carried out. On a step 7 indicator AIRR for the given mark of vehicle for term exploitation T_3 pays off. On the eighth step is comparison of indicators AIRR and average on republic to the rate of commercial banks on deposit also is estimated economic efficiency of use of the given mark of vehicle by national carriers in sphere of international transportation of cargoes by the above-stated principle. Calculations by the above-stated technique for car MAZ 544069 are presented in table 1.

Apparently from the table cumulative action of operational factors leads to that considered by us as criterion of efficiency the indicator of average internal profitability of capital investments in car MAZ is negative size (-5,61 %) - enclosed in MAZ the capital decreases in due course. It just also is at the bottom of that under existing conditions, businessmen of sphere of international transportation of cargoes do not want to get MAZ for their use in the given sphere.

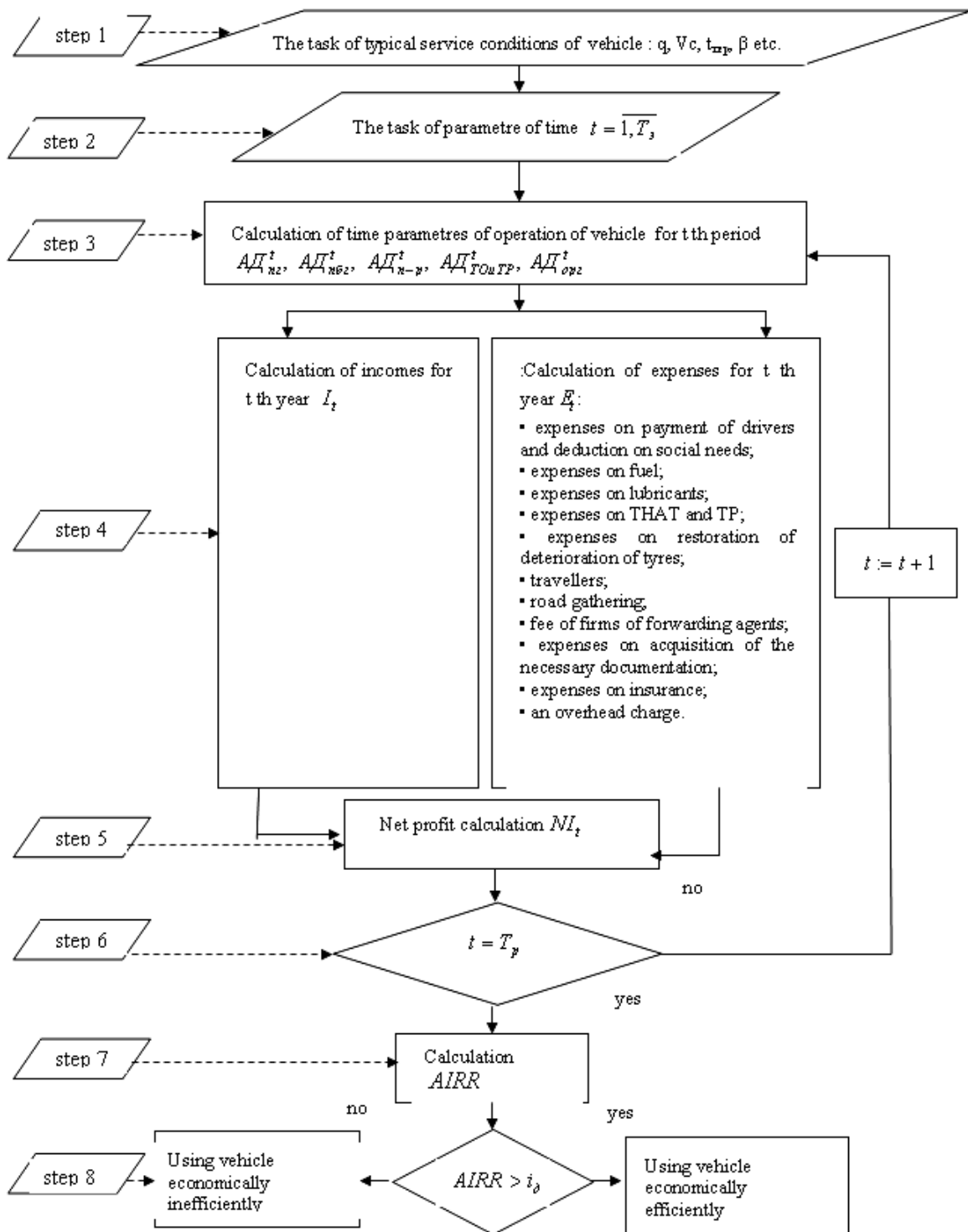


Figure 2: Algorithm of a technique of a mark of economic efficiency of use of vehicle s at performance of international transportation of cargo

Table 1: Cost indexes of use of the MAZ 544069

Factor	Years of exploitation						
	1	2	3	4	5	6	7
Incomes, euro	51437,13	51115,15	50787,81	50455,30	50117,83	49775,65	49429,00
Expenses, euro	43320,32	44064,47	44795,45	45513,16	46217,56	46908,61	47586,36
Including							
Expenses on 3П drivers with deductions	2869,31	2838,06	2807,26	2776,90	2746,98	2717,52	2688,50
Expenses on fuel	19416,90	19395,72	19366,95	19330,71	19287,14	19236,40	19178,68
Including							
Expenses on fuel at movement on EU	12130,42	12117,18	12099,21	12076,57	12049,35	12017,65	11981,59
Expenses on fuel at movement on Belarus and the Russian Federation	7286,48	7278,54	7267,74	7254,14	7237,79	7218,75	7197,09
The expenses connected with technical operation PC	1226,50	2100,52	2969,95	3834,52	4693,97	5548,07	6396,57
Including							
Expenses on maintenance service	442,88	440,11	437,29	434,43	431,52	428,58	425,59
Expenses on operating repair	649,70	1376,67	2099,86	2819,06	3534,05	4244,64	4950,62
The expenses connected with restoration of transport process at breakage of the vehicle on a line	133,91	283,74	432,80	581,03	728,40	874,85	1020,36
Expenses on restoration of deterioration of tyres	710,12	705,67	701,15	696,56	691,90	687,18	682,39
Expenses on reimbursement to drivers at official journeys	6966,36	6922,76	6878,42	6833,39	6787,68	6741,34	6694,39
Expenses on road gathering	1996,71	1984,21	1971,50	1958,59	1945,49	1932,21	1918,75
Expenses on acquisition of necessary documents	2773,96	2764,07	2754,02	2743,81	2733,44	2722,93	2712,28
Including							
Expenses on acquisition of permission EKMT	1194,14	1194,14	1194,14	1194,14	1194,14	1194,14	1194,14
Expenses on acquisition of customs documents	1568,44	1558,62	1548,64	1538,50	1528,21	1517,77	1507,20
Expenses on acquisition of waybills (CMR)	11,38	11,31	11,24	11,17	11,09	11,02	10,94
Expenses on insurance	5151,66	5144,64	5137,38	5129,87	5122,13	5114,16	5105,97
Including							
Expenses on insurance «autocasco»	2631,96	2631,96	2631,96	2631,96	2631,96	2631,96	2631,96
Expenses on CMR-insurance	1059,85	1053,21	1046,47	1039,62	1032,67	1025,61	1018,47
Expenses on medical insurance of the driver	39,80	39,80	39,80	39,80	39,80	39,80	39,80
Expenses on insurance of responsibility of a carrier in the Russian Federation	352,48	352,48	352,48	352,48	352,48	352,48	352,48
Expenses on insurance of responsibility of a carrier in Belarus	85,80	85,80	85,80	85,80	85,80	85,80	85,80
Expenses on insurance "Green card"	630,00	630,00	630,00	630,00	630,00	630,00	630,00
Expenses on responsibility insurance before customs bodies	351,77	351,38	350,86	350,21	349,42	348,50	347,45
Overhead charge	2208,82	2208,82	2208,82	2208,82	2208,82	2208,82	2208,82
The profit tax	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Net profit	8116,81	7050,68	5992,36	4942,14	3900,28	2867,03	29233,37
Estimated market cost of automatic telephone exchange in the end of the project, euro							27390,73
AIRR							-5,61

References

1. Kostin I.M., Fashiev H.A. application of a method of monetary streams at a mark of economic efficiency of lorries//the Machine engineer. – 2002. - №2. – with. 2-10.
2. Fashiev H.A., Krahmaleva A.V. mark of economic efficiency of operation and manufacture of lorries//the Autostandard. – 2004. - №1. – with. 26-30.