Цель. Обеспечение наиболее эффективного варианта функционирования железных дорог с позиции устойчивого развития.

Методика. Выполнен комплексный анализ работ в области функционирования подразделений железнодорожного транспорта и внедрения принципов устойчивого развития. Это позволило выделить основные направления повышения эффективности функционирования железных дорог с позиции устойчивого развития. Разработка модели функционирования железных дорог проводилась с использованием математического аппарата теории множеств и графов, которая позволяет структурировать понятие „железная дорога“ как сложную систему. Показаны основные этапы и взаимосвязи при моделировании процессов функционирования железных дорог на макро- и микроуровнях.

Результаты. Разработана математическая модель процесса функционирования железных дорог на двух уровнях: макроуровень – моделирование процесса передвижения вагонопотока по транспортной сети в рамках железной дороги; микроуровень – моделирование процесса обработки вагонопотока на станциях в составе железной дороги.

Научная новизна. Адекватное описание процесса функционирования железных дорог с позиции устойчивого развития, основанное на аппарате теории множеств и графов.

Практическая значимость. На базе предложенной модели функционирования железных дорог на макроуровне возможно решение задач оптимального распределения грузовой работы не только между станциями, обслуживающими подъездные пути предприятий горнодобывающей промышленности, но и всеми станциями железных дорог при обслуживании местных вагонопотоков. С использованием предложенной модели функционирования грузовой технической станций на микроуровне решается задача определения оптимальных количественных характеристик производственных мощностей станций.

Ключевые слова: *горнодобывающая промышленность, железнодорожный транспорт, устойчивое развитие, математическая модель*

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CONCEPTUAL BASES OF HAUL TRUCKS COMPETITIVENESS FORMATION FOR ROCKS TRANSPORTATION IN OPEN-CUT MINING

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КОНЦЕПТУАЛЬНІ ЗАСАДИ ФОРМУВАННЯ КОНКУРЕНТОСПРОМОЖНОСТІ АВТОСАМОСКИДІВ ДЛЯ ТРАНСПОРТУВАННЯ ГІРСЬКИХ ПОРІД У КАР’ЄРАХ

Purpose. Economical implementation of competitive strengths of haul trucks by the generalization of scientific thoughts, tenets and principles forming a high level of competitiveness of the trucks.

Methodology. Results are received through the application of several methods: critical analysis and systematization were used in order to determine the notion of competitiveness and indexes of quality evaluation; ABC-analysis and mathematical statistics were exploited in order to rank the indexes of competitive strength evaluation depending on technical characteristics of a vehicle; economical and mathematical modeling were applied in order to determine the expenditures concerning the transportation of rocks; finally, the method of network modeling assisted to the optimization of staffing and interrelated projects.

Findings. Special aspects regarding competitive strengths of the haul trucks which are designated for exploitation in open-pit mines were revealed. This identifies technical characteristics of the trucks which are adjusted to special conditions and rules of roach transportation according to the requirements of mining enterprises.

It is demonstrated that practicality concerning the substitution of certain haul truck models and means of developing their competitive strengths should be determined according to the integrated index of competitiveness which is supposed to be calculated as a ratio between group economical indexes and group technical indexes. The economical

index is substantiated regarding the positive and negative influence of automobile technical options on its singular economical indexes.

Unit costs of establishing new technological work conditions in an open-pit mine connected with putting new models of haul trucks into operation were set up. Direct expenses are taken into account as well as indirect fuel consumption required for open-pit work connected with haul trucks being put into service. The structure of the innovative project based on certain types of work is offered which can be independently performed either by an enterprise, business coalition or outsourcing principles. The structure of innovative activity management was developed owing to innovative department is being added to the automobile factory.

Originality. Is embodied in the development of the concepts concerning economical evaluation of competitiveness of haul trucks and methods for improving competitive strengths of haul trucks which are bond with innovations.

Practical value. Methods for improving competitive strengths of haul trucks concerning their exploitation in the conditions of open-pit mine are identified. Additionally, research and methodology tools of innovative project implementation to improve haul trucks are substantiated.

Keywords: *competitiveness, products of automobile industry, innovative project costs, investments, economic substantiation*

Introduction. Autotruck transportation is the most widespread and attractive medium for rocks transportation in open-pit mines for short prospective. 40–80 % of total expenses in open-pit mine production are comprised of the expenses regarding the process mentioned above, depending on the conditions of transport exploitation. Nowadays, home-produced haul trucks, compared to foreign haul trucks in the international market, rank almost the worst ones in terms of their self-cost and volume of transportation. Thus, Ukrainian automobile factories have to increase the volume of competitive haul trucks production. That is why the increase in haul trucks competitive rates which meet the requirements connected to rocks transportation is number one task for the national automobile factories.

Analysis of the recent research and publications. There are many definitions concerning the competitiveness of automobile products today. Some authors think that it is an aggregate of consumer properties of a vehicle [1], other authors would rather lean to the opinion that it is a vehicle's ability to be more attractive for a consumer in comparison with another automobile; [2] some scholars may also allege that it is a set of consumer and cost characteristics which are crucial in order to succeed in a market. It is worth mentioning that the definitions mentioned above are always elaborated without a connection between quality properties of an automobile and its consumption cost, which attract potential consumers the most. The competitiveness, as an object of management, according to M. Porter's definition [3], is a succession of steps undertaken in order to create customer values. One of the steps is a crucial one and is able to form competitive strengths.

V. I. Prokopenko's [4] and O. A. Temchenko's [5] scientific works concerning special aspects of transportation means in home-located open-pit mines are analyzed and generalized. The quintessential problem, according to the research [6], is that there is a steady tendency of exploitation conditions worsening when haul trucks are used. "Arcelor Mittal" is a prime example illustrating diverse conditions of exploiting haul trucks, where vehicles of the same models are engaged in slag processing, at tailings of 40–50 meters high, in open-pit mines whose depth is 80–110 meters and in two open-pit mines whose depth is 250–350 meters. However, these works do not consider issues of haul trucks adaptation to the conditions of rock transportation in open-pit mines properly.

According to scholars from Paris, the quality of product, its novelty and activities deliberated to foster sales rates in accord with market alterations must be related to indexes of competitiveness. In order to evaluate the competitiveness of a product, singular, group and integral indexes should be calculated. Singular indexes demonstrate a percentage ratio between any technical or economical aspect of a product and the same aspects of rival one. The group index unites singular indexes in accord with their homogeneous characteristics [7]. This estimation is based on the relative index which can be calculated through a comparative approach. Faskhiev H. A. [8] offers a set of indexes showing features of a vehicle through their attributes: application field (constructive, technological, and consumptive); evaluation concept (quality level, standard); characteristics (singular, complex, and integral); method for estimation (absolute, relative, per unit); the significance of estimation (main, secondary).

Summing up the analysis mentioned above, it is possible to allege that the competitiveness of haul trucks should be associated with the needs of certain consumptive group and, hence, any haul truck must be characterized through indexes determining its ability to transport rocks in open-pit mine conditions. According to Khrystenko L. M. [9, 10], under current conditions of automobile manufacturing enterprises, providing the aggravation of competition in the market, it is an eminent need to improve organizational structure regarding the creating of innovative automobiles. Thus, it will foster competitive strengths in the market and provide competitiveness of the products, in general.

Scientific papers, that are presented, contain possible solutions of actual tasks concerning further development of theoretical and applied methods providing a substantiation of products competitiveness. However, the scientific works provided above do not throw enough light on the possibilities to form competitive strengths of home-produced haul trucks through their innovative improvements concerning better adaptation to the conditions of rock transportation in open-pit mines.

Objectives of the article involve theoretical and methodological generalization of conceptual approach-

es to forming the competitiveness of haul trucks by means of innovation implementation according to the demands of mining enterprises.

Presentation of the main research. The demands of mining enterprises dealing with haul trucks are based on special aspects of exploitation conditions in open-pit mines. The aspects cause significant damage of auto body due to interaction with heavy rocks and accelerated deterioration of automobile running gear. In addition, the aspects cause enormous gas expenditures caused by the fact that haul trucks have to use temporary roads tending to be altered once a certain type of work is done. Due to the fact that quarry face tends to be altered from time to time, there is a need to implement new changes in the working process of haul tracks taking its connection with technological equipment into account. According to the aspects mentioned above, it is proved that haul truck competitiveness must be perceived as a complex characteristic reflecting their ability to adapt to the special aspects of the transportation process in such a way that it will provide technological interaction with operating facilities accomplishing other kinds of manufacturing processes in an open-pit mine.

A well-grounded method for evaluating the significance and priority of indexes of haul trucks competitiveness was created according to index values and exploitation conditions of haul trucks and owing to a great number of scientific papers (approximately 900) written by various authors (approximately 45) being analyzed. Owing to ABC-analysis, the rated list of indexes, which are sorted out by groups depending on the extent of influence on economic and technical results of haul trucks application, is received:

A (20 %) – are involved more frequently and demonstrate 80 % of priority;

B (30 %) – are secondary ones, and demonstrate 15 % of priority;

C (50 %) – are the least appreciated, demonstrate 5 % of priority.

The analysis of Pareto's diagram provides evidence that scholars have referred to the indexes of group A (gas expenses, price of a vehicle, self-cost of maintenance, full weight of a vehicle, type of gas, motion velocity etc.) 316 times which is 50 % of the total number of references. Indexes of group B (generator output, cycle of repair works, reliability, safety, driving complexity etc.) have been detected 196 times (31 %) showing their significant role due to their having 81 % of progressive total concerning every index. The rest of indexes (119 references) including materials-output ratio, energy-output ratio, period of repayment, export volume, aftersales service, defects, expenses of current repair works and compliance with ecological standards are related to group C. These indexes are important since their influence on each other demonstrates the biggest progressive total.

Review study regarding Kraz producers and consumers was accomplished in order to complement the evaluation of its competitive strengths provided above. Constructor engineers, managers of technical service departments, mechanic engineers, and general managers of "AutoKraz" company were involved in this study (34 persons in total). The priority of evaluation indexes was defined. These indexes were divided into three groups: 1) quality formation; 2) organization of supply; 3) the process of price formation. Safety, reliability, longevity and being serviceable are the most significant indexes among the quality ones, whereas influence on the surrounding environment and esthetic features are less important according to the experts' point of view. As for the second group, consumers were most satisfied by the index of on-time delivery, whereas the index of working ability satisfied consumers least of all. Considering price formation, cost and quality of an automobile are the most important factors and the company's ability to preserve the same level of prices is the least important one.

Thus, theoretical and applied indexes of competitiveness evaluation which can be used by a consumer during vehicle purchasing or in order to find media to improve vehicles being already in service are provided. In order to provide convenient computations and understand their physical sense better, the scientific approach was improved and, hence, above mentioned indexes can be generally defined owing to the integral index of competitiveness $I_{a.e.}$ which can be calculated as a ratio between group index G_e depicting economical characteristics of a vehicle and group index G_m depicting its technical characteristics. The influence (positive or negative) of technical characteristics on economical results ensuing after transportation of goods and their compensation of each other must be taken into account. The ability of the main model to be sold in the market comparatively to the ability of a basic one is offered to be evaluated through the index defined as the level of technical and economic effectiveness and presented as the following equation

$$E_{m.e} = \frac{1 - G_e}{G_m - 1}. \quad (1)$$

In the equation (1) the difference $(1 - G_e)$ determines economic effect ensuing as a result from basic model being replaced by the main one (to what degree expenditures either increase or decrease), the difference $(G_m - 1)$ is a technical effect (the volume of transportation) which can decrease or increase as well. In their turn, group indexes G_m та G_e are calculated as a ratio between singular indexes of homogeneous group and presented as a percentage number (the ratio between the magnitude of a characteristic being elaborated belonging to a new vehicle and that one of the basic vehicle) based on weighing coefficients. Providing that the influence of technical characteristics on the economical results is taken into account, the following equations were ensued

$$G_e = \sum_{j=1}^{m} \frac{P_{je.b}}{P_{je.o}} a_{je}; \quad (2)$$

$$G_m = \sum_{i=1}^{n^+} \frac{P^+_{im.o} a_{im}}{P^+_{im.b}} - \sum_{l=1}^{n^-} \frac{P^-_{lm.o} a_{lm}}{P^-_{lm.b}}, \quad (3)$$

where $P_{je.o}$, $P_{je.b}$ are j indexes of vehicle competitiveness in respect to the main model (that one which is offered for replacement) and basic model, $j = 1, m$; a_{je}, a_{im} stand for significance of economic j index, i and l technical indexes respectively which can demonstrate positive or negative influence according to the experts' estimation.

$P^{+}_{im.o}$, $P^{+}_{im.b}$ are technical indexes of the main and basic models characterizing positive influence on economic indexes, $i = 1, n^{+}$; $P^{-}_{lm.o}$, $P^{-}_{lm.b}$ are technical indexes of the main and basic models characterizing negative influence on economic indexes, $l = 1, n^{-}$.

Using above provided formulas (1–3) as a background, comparative evaluation of competitiveness regarding home-produced models of haul trucks and foreign ones was performed: Kraz-65055 whose load-carrying capacity is 16 tons (Kraz), Kamaz-6520 – whose load-carrying capacity is 18 tons (Kamaz), Maz-551605 – whose load carrying capacity is 20 tons (Maz) and IVECO-260.30H – whose load-carrying capacity is 20 tons (IVECO). All models were compared to the basic one Kraz-65032-043 (16 tons) (Table).

It was found that, according to the set of economic indexes, Kraz and Maz ($G_e = 0.97$) are the most attractive for mining enterprises, whereas IVECO ($G_e = 3.11$) is the least attractive one. Despite this fact, IVECO, according to technical characteristics, is 2.36 times as attractive a haul truck in comparison with the basic model. The exploitation of Maz and Kraz will result in worsening of economic results as well, but to the way less extent ($E_{m.e} = –0.04$).

If a vehicle producer does not consider customers' complaints, it will lead to additional expenses and, hence, increasing the cost in general and decreasing competitiveness of vehicles. A great number of rejections occur before car mileage reaches 5000 miles. This means that car manufacturing enterprise has some problems with quality control. Moreover, it provides strong evidence of defected details and discrepancy between technical characteristics of haul trucks and the conditions of their exploitation in open-cut mines. In order to calculate the cost, automobile defectiveness defined as B_∂ must be divided into the following addends

Table

The level of technical and economic exploitation of haul trucks

№	Indexes	Автосамоскиди			
		Kraz	Kamaz	Maz	IVECO
1	Group economic index	0.97	1.04	0.97	3.11
2	Group technical index	0.21	1.12	0.24	2.36
3	Economic effect	0.03	–0.04	0.03	–2.11
4	Technical effect	–0.79	0.12	–0.76	1.36
5	Technical and economic effectiveness	–0.04	–0.33	–0.04	–1.55

$$V_d = V_{vd} + V_{ud} + V_{zd}, \quad (4)$$

where V_{vd} stands for expenses concerning the detection of defects (diagnostic), UAH; V_{ud} stands for expenses concerning the elimination of already existing defects, UAH; V_{zd},, stands for expenses concerning the development of measures preventing the formation of new defects in future, UAH.

This approach requires that demands of consumer-enterprises should be quickly taken into consideration during the elaboration of innovative projects regarding the improvements of home-produced haul trucks. This, undoubtedly, will foster the formation of haul truck competitive strengths. Expenditures C_{in} connected to the development and implementation of innovative projects are elaborated in details and must be added to constant costs B_n of an enterprise. In case of a vehicle being improved, expenses C_{in} are one-time paid and task-oriented. Moreover, they are connected with prime costs $C_{n.o}$ and with variable costs $V(O_n)$ due to the fact that these particular costs C_{in} will define the magnitude of $V(O_n)$ ensued as a result from certain project being embodied. Consequently, the production release can be demonstrated as the following sum

$$V_n = V_z O_n + C_{n.o} + C_{in}. \quad (5)$$

If linear variation of total costs $V_z O_n$ (production release is handled as a single-step mono-production) occurs, magnitude V_z will be greater or smaller than the expenses on current haul truck model due to the influence of every factor.

In order to plan the V_z, depending on the volume of production release O_n , empirical consistency of probability suggested by Rite T. P., regarding reducing expenses per unit and providing the condition of volume production increase, should be applied. This conclusion emphasizes the significance of competitive strength formation increasing the volume of sales and decreasing the self-cost of vehicle production.

Expenditures concerning innovative project investment can be defined according to the following variants: 1) a purchase of constructing and technological documentation in other non-related organizations; 2) organization of innovative project development using the factory's own resources.

The algorithm defining the practicability of innovative product implementation, according to its costs concerning every stage of its implementation, is demonstrated in Fig. 1.

The management of vehicle competitiveness is a process comprised of dependent and independent projects which can be characterized by their goals, amount of finance and terms duration. This management is based on already existing potential and mobilization potential of an automobile manufacturing plant. The former is defined by an opportunity to use already formed assets of an enterprise, whereas the latter characterizes the opportunity to involve finances and resources of potential business partners interested in this joint venture.

Project approach to the management is reflected owing to network modeling which provides an oppor-

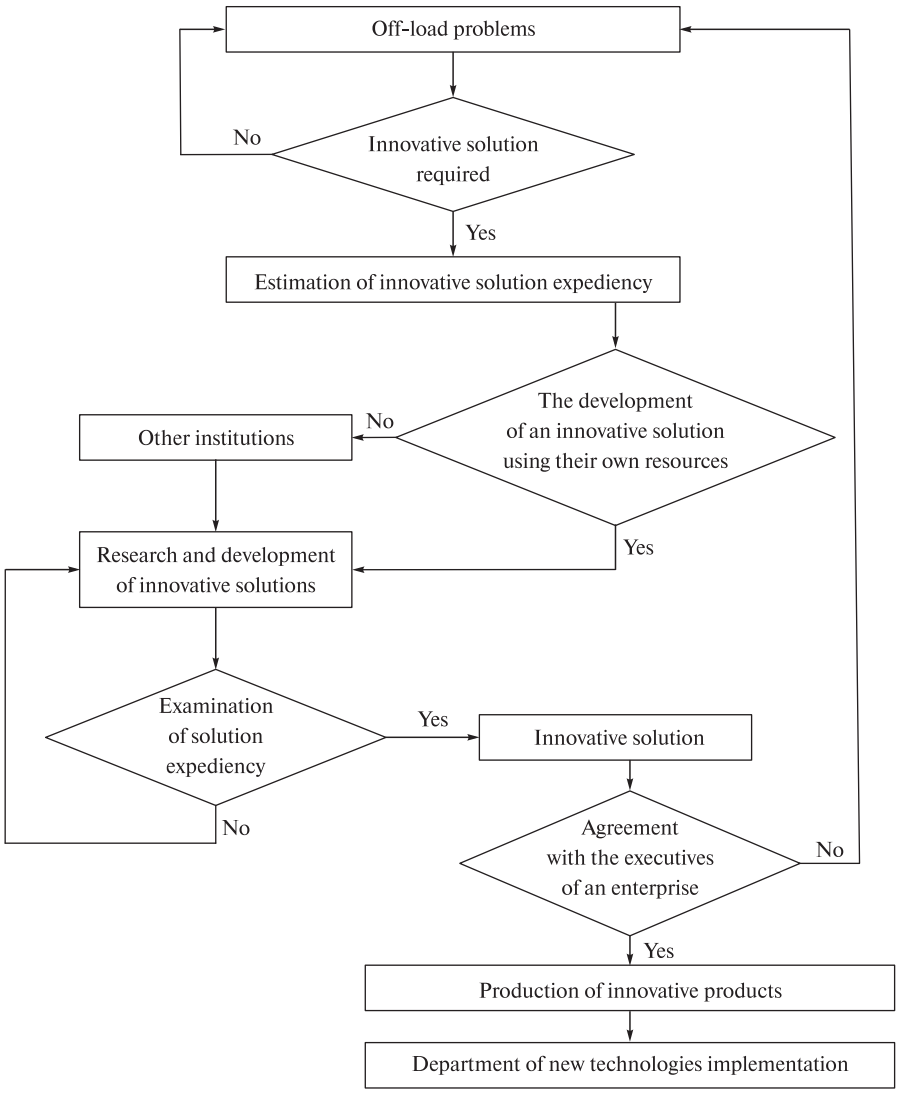

Fig. 1. Algorithm of decision making concerning the expediency of innovative product implementation according to its competitiveness

tunity to predict and elaborate alternatives during every stage of the project. At the same time a task of the project according to its structure and types of different works can be accomplished by the enterprise itself, coalition of business partners and outsourcing companies (Fig. 2).

The structure of the management process is considered using the example of automobile engine being renewed due to its low output, enormous costs of combustible and lubricating materials, contamination of the atmosphere. It is found that if an automobile manufacturing factory implements the project independently, the duration of this process will take the minimum of 323 days. On the other hand, if the factory uses resources and finances of other non-related companies, the duration of project implementation will take 139 days only.

Already existing organizational structure of "AutoKraz" company management must meet the require-

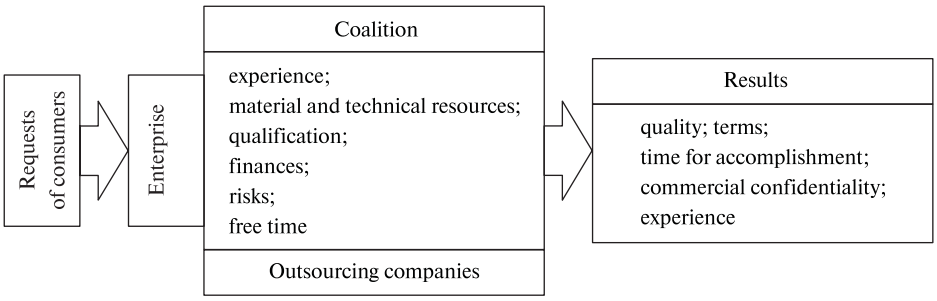

Fig. 2. Subjects and methods of project implementation on developing features inherent to competitive products

ments and provide stable competitive strengths at the same time. In order to do that, a certain structure is offered which involves introducing an innovative department. The innovative department is to purposefully find solutions for implementing new technologies and methods based on the system approach. The main function of this department is the implementation of results ensued from research studies in order modify vehicle models. Moreover, analysis, projecting and control of innovative projects implementation are supposed to be included in the main function of the department. All in all, the innovative process must include initialization, development and production of automobile products with new features being capable to increase the competitiveness through the satisfaction of customers' specific needs (Fig. 3.).

The choice of certain haul truck models by a user-enterprise is based on two main criteria: self-cost of their exploitation and their loading capacity. Costs per unit for maintaining technological conditions of haul truck exploitation (calculations are made using 1 ton-kilometer) which is comprised of direct and indirect costs is a function of transported rock volume and distance of transportation depending on chosen vehicle model and can be calculated using the following formula

$$V_{1m.km} = \frac{V_{e.s} + V_{e.d}}{O_{m.a} \cdot L_m}, \qquad (6)$$

where $V_{e.s}$,$V_{e.d}$ are the maintenance costs and additional costs for mining works in the open-pit mines connected with new haul truck model being implemented and exploited, UAH/month; $O_{m.a}$ is the volume of rocks transported by a haul truck, ton/month; L_m is the distance of rocks transportation, km.

According to the (6), the costs of rocks transportation in an open-pit mine are calculated as the sum of costs concerning the exploitation of transportation means and the alteration of work conditions caused by these means. The implementation of a new haul truck model may result in the increase or decrease in a transportation distance, the volume of rocks being subjected to further processing, etc. Possible alterations of competitive strengths depending on the different depth of haul truck exploitation are calculated owing to adjusting coefficients. They adapt technical indexes of both negative and positive influences on the economic results ensued from the basic haul truck model exploitation. The level of the vehicle adaptation to efficient work depending on different depths of mining works reflects the producer's interest regarding this consumer segment (mining enterprises).

According to the production cost of 1 ton/km of rock transportation using haul trucks, Kraz-65032-043 is the worst model, whereas IVECO-260,30H and Maz-551605 are the best ones with Kraz-C20,2 acting as their competitor. The open-pit mine being deepened by approximately 100–300 meters, the cost will decrease by 10–13 %, which can be explained by the fact that maintenance costs will decrease as well (5–11 %) including gas expenditures (28–39 %).

According to the study research mentioned above, the initiation of new constructive alterations being implemented in automobile products must be accomplished through the following priorities of subjects: consumer – auto producer-partners of auto producer. The last ones initiate the projects providing the presence of their own innovations. Transfer of technologies is very important inasmuch as it stimulates innovative development. The interaction between the auto producer and outsourcing companies must be regular, which will provide detailed information about the market of such services and practicability of outsourcing companies' resources being exploited in order to establish competitive strengths of vehicles.

The division of work regarding the project of vehicles improvement between performers is accomplished in accord with their professional specialization. The high-

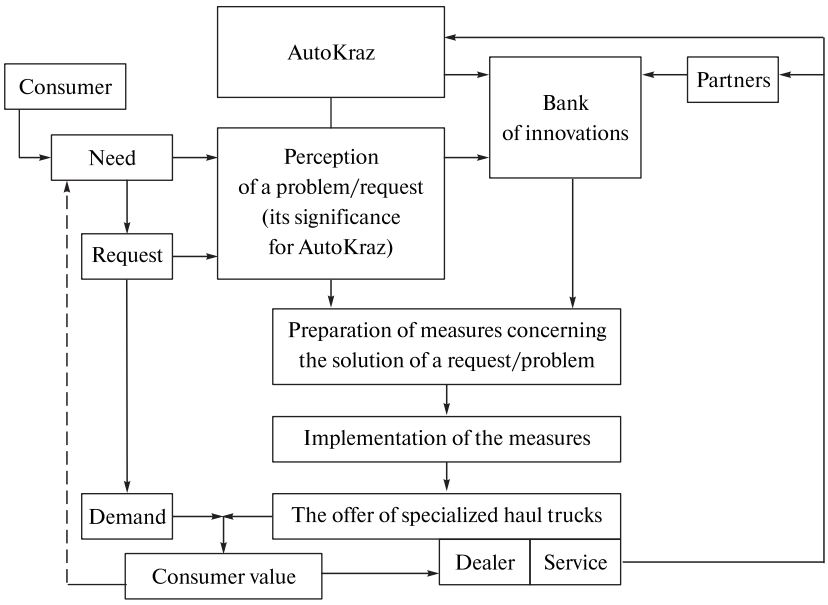

Fig. 3. The formation of haul truck consumer values inherent to subjects initiating the process of haul truck modification

est rate, according to the criteria of quality, duration and costs, is given to automobile producer, whereas the third and the second rates which are equal are given to the producer's partner and "Producer and its partners" group, respectively: better results are achieved concerning duration terms; cooperation of partners provides lower costs of work. Two stimuli concerning strategic partnership and its risks are named.

In spite of the evaluation provided above, the financial risks of budget deficit are associated particularly with the activity of "AutoKraz" factory. This risk can decrease if responsibility is transferred to outsourcing companies. Thus, an auto producer, as a project orderer, countenances a significant variation of work costs providing its direct participation in the working process. Subjects of the project were given similar evaluation according to factor of time, particularly, the probability of specific work being accomplished by performers in excess of time limits (Fig. 4).

According to the information provided above, the characteristics of renewing construction process of a haul truck are presented through various important factors. Every factor is worked out in detail to certain extent which can be used in order to develop media of a vehicle adaptation to the needs of specific customer segment of the market (Fig. 4). Production improvements are connected to evaluation of money flows which reflect the appropriateness of this activity including the list of accessible finance resources, income resources and competitive potential concerning every subject of a market (producer, consumer).

Conclusions and recommendations for further research.

1. Already existing scientific approaches to automobile competitiveness evaluation and searching new ways of its increasing do not allow considering special aspects of competitive strengths formation of haul truck designated for exploitation in open-pit mines.

2. The competitiveness of haul trucks must reflect their capability of adaptation to mining and technological conditions of rock transportation in such a way that it will fully satisfy the needs of mining enterprises.

3. The group economic index is supposed to be calculated with regard to positive or negative influence of technical characteristics of a vehicle on its single indexes in order to provide substantiation of integral indexes. This gives an opportunity to estimate the expediency of replacing certain haul truck models and to define the ways of their competitive strengths formation.

4. While calculating costs per unit for providing technological conditions of mining works connected with new haul truck models brought into service, both direct and indirect costs on providing technological condition of exploitation must be taken into account.

5. The structuring of the innovative project is suggested according to its types of work which can be accomplished independently by the enterprise itself, by the coalition of business partners or by outsourcing companies. The need to use a certain variant at specific stages can be explained by the fact that there are some resource limits and mobilization potential of an enterprise. The best succession of project stages which would guarantee the minimum term of its implementation can be defined owing to network modeling.

6. The implementation of the innovative project must be accomplished through a special innovative department being created and, hence, providing the strong connections with other departments with the purpose of detection, perspective evaluation and realization of new ideas.

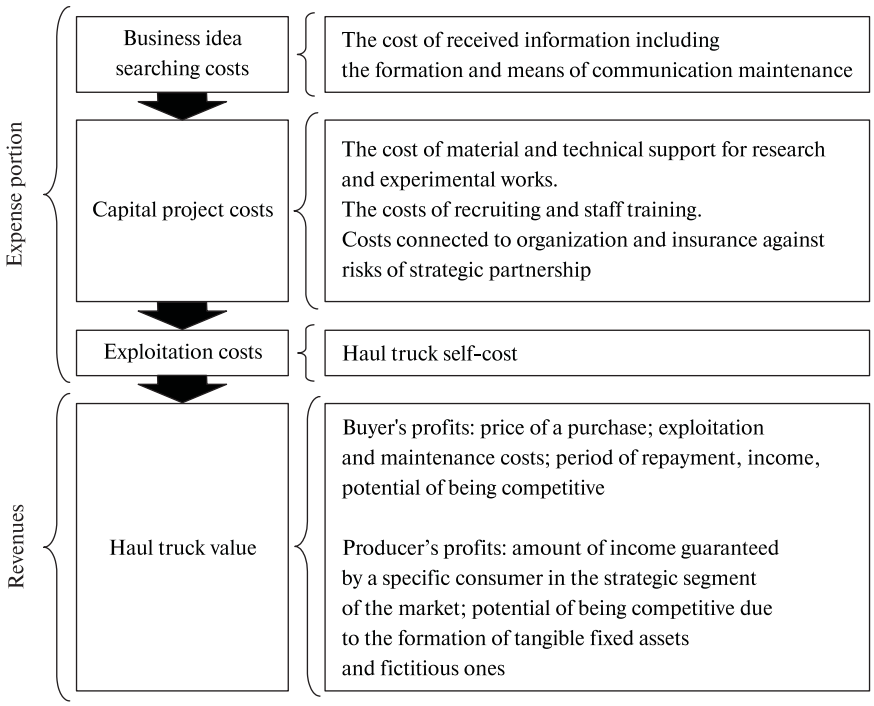

Fig. 4. Economical constituents of the process of formation of products value

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Мета. Економічне забезпечення конкурентних переваг кар'єрних автосамоскидів шляхом узагальнення сукупності наукових ідей, положень та принципів, за якими формується конкурентоспроможність автомобілів.

Методика. Результати отримані за рахунок застосування методів: критичного аналізу та систематизації – для визначення поняття конкурентоспроможності та показників оцінювання якості самоскидів; АВС-аналізу, математичної статистики – для ранжування показників оцінки конкурентних переваг залежно від технічних характеристик машини; економіко-математичного моделювання – для визначення обсягу витрат на перевезення гірських порід; сітьового моделювання – для оптимізації складу виконавців та пов'язаних між собою проектів.

Результати. Виявлені особливості формування конкурентних переваг автосамоскидів, призначених для експлуатації в кар'єрах, що визначає рівень їх технічних характеристик, які адаптовані до гірничо-технологічних умов перевезення гірських порід згідно з вимогами гірничодобувних підприємств.

Показано, що доцільність заміни певних моделей автосамоскидів та напрями формування їх конкурентних переваг слід встановлювати, виходячи з інтегрального коефіцієнта конкурентоспроможності, який запропоновано визначати за співвідношенням групового економічного та групового технічного показників. Економічний показник обґрунтований з урахуванням позитивного або негативного впливу технічних параметрів автомобіля на його одиничні економічні показники.

Встановлені питомі витрати на забезпечення технологічних умов гірничих робіт, пов'язаних із введенням в експлуатацію нових моделей автосамоскидів. Поряд із прямими витратами врахову-

ються непрямі витрати палива на гірничі роботи в кар'єрі, пов'язані із введенням в експлуатацію автосамоскиду. Запропоноване структурування інноваційного проекту за певними видами робіт, що можуть бути виконані самостійно підприємством, в коаліції бізнес-партнерів, на засадах аутсорсингу. Удосконалена структура управління інноваційною діяльністю автозаводу шляхом введення до неї інноваційного відділу.

Наукова новизна. Полягає у розробці концепції формування економічного оцінювання конкурентоспроможності кар'єрних автосамоскидів, а також методичному обґрунтуванні шляхів підвищення їх конкурентних переваг на інноваційних засадах.

Практична значимість. Визначені шляхи підвищення конкурентоспроможності автосамоскидів стосовно особливостей їх експлуатації в кар'єрних умовах, обґрунтований науково-методичний інструментарій впровадження інноваційного проекту щодо модернізації самоскиду.

Ключові слова: *конкурентоспроможність, автомобільна продукція, інноваційний проект, витрати, інвестиції, економічне обґрунтування*

Цель. Экономическое обеспечение конкурентных преимуществ карьерных автосамосвалов путем обобщения совокупности научных идей, положений и принципов, по которым формируется конкурентоспособность автомобилей.

Методика. Результаты получены за счет применения методов: критического анализа и систематизации – для определения показателей оценки качества самосвалов; АВС-анализа; математической статистики – для ранжирования показателей оценки конкурентных преимуществ в зависимости от технических характеристик машины; экономико-математического моделирования – для определения объема расходов на перевозку горных пород; сетевого моделирования – для оптимизации состава исполнителей и связанных между собой проектов.

Результаты. Выявлены особенности формирования конкурентных преимуществ автосамосвалов, предназначенных для эксплуатации в карьерах, что определяет уровень их технических характеристик, которые адаптированы к горно-технологическим условиям перевозки горных пород в соответствии с требованиями горнодобывающих предприятий.

Показано, что целесообразность замены определенных моделей автосамосвалов и направления формирования их конкурентных преимуществ следует устанавливать, исходя из интегрального коэффициента конкурентоспособности, который предложено определять по соотношению группового экономического и группового технического показателей. Экономический показатель обоснован с учетом положительного или отрицательного влияния технических параметров автомобиля на его единичные экономические показатели.

Установлены удельные расходы на обеспечение технологических условий горных работ, связанных с введением в эксплуатацию новых моделей автосамосвалов. Вместе с прямыми затратами учитываются непрямые расходы топлива на горные работы в карьере, связанные с введением в эксплуатацию автосамосвала. Предложено структурирование инновационного проекта по определенным видам работ, которые могут быть выполнены самостоятельно предприятием, в коалиции бизнес-партнеров, на основе аутсорсинга. Усовершенствована структура управления инновационной деятельностью автозавода путем введения в нее инновационного отдела.

Научная новизна. Заключается в разработке концепции формирования экономической оценки конкурентоспособности карьерных автосамосвалов, а также методическом обосновании путей повышения их конкурентных преимуществ на инновационных принципах.

Практическая значимость. Определены пути повышения конкурентоспособности автосамосвалов касательно особенностей их эксплуатации в карьерных условиях, обоснован научно-методический инструментарий внедрения инновационного проекта по модернизации самосвала.

Ключевые слова: *конкурентоспособность, автомобильная продукция, инновационный проект, расходы, инвестиции, экономическое обоснование*

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