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ORGANIZATIONAL AND ECONOMIC ASPECTS OF BENCHMARKING INNOVATIVE PRODUCTS AT THE AUTOMOBILE INDUSTRY ENTERPRISES

The article deals with the nature and characteristics to use benchmarking in the automobile industry domestic enterprises activity under the current economic conditions. The article identifies the concept of benchmarking, examining its stages, determinates the efficiency of benchmarking in workautomakers. It determines the economic aspects of the benchmarking in the work of automobile industry enterprise. The stages of innovative products benchmarking in the modern conditions of the productive forces development and market factors was analysed. Market electric vehicles are studied in Ukraine. The authors improved methodical approach to assess the vehicles selection with the best technical parameters based on benchmarking, which, unlike the existing ones, based on the calculation of the vehicles technical specifications integral factor in order to establish a better competitive product at automobile industry companies among evaluated. Aspects that need to be taken into account in the CJSC "Zaporizhia Automobile Building Plant" management to improve the competitiveness of its electric vehicles are identified. Benchmarking can be regarded as one of the most important area of marketing strategic research. Enterprises of automotive industry must develop activities to study "best" products and marketing process. It is proposed to do it compared to the enterprises which are competitors. Prospects for further study should be related to the methodological approaches' formation to identify market segments for cars with electric motor depending on price, quality and technical characteristics.

Keywords: benchmarking, phase, enterprise, electriccar, automobile industry, assessment.

Problem statement. The term "benchmarking" has emerged in economic theory relatively recently, only in 70th of the twentieth century and it has not been actively implemented in

practice. The world is constantly changed, and the entrepreneurship is developed too. It leads to the emergence of such concept as benchmarking. Currently, the study and analysis methodology of this economic category has not acquired a clear form yet, but actively is leading to it. This topic is relevant, because many large, medium and even small companies of automotive industry perform benchmarking in their activities, and in many cases, they manage it quite well [3].

Analysis of recent research and publications. The development of benchmarking concepts and methods were studied by the following foreign scientists as R. Camp [10], D. Davis [11], H. Kohl [14], D. Longbottom [13], R. Mann [14], K. McKinnon [11], B. Searles [14], S. Walker [11].

In Ukraine, the problem of benchmarking was learned by: E. Arefev and A. Arefeva [1], R. Feschur [9], E. Knyazev [2], T. Merenyuk [3; 9], Y. Yevdokimova [2] and others.

Unsettled components of the general problem. Among the studied works, it should be noted that insufficient attention is paid to the analysis of methods to choose the best alternatives for the relevant characteristics of the products from automotive industry enterprises. That's why the authors determine the issue in this article.

The aim of the article is to determine the nature and characteristics of the benchmarking use in the automobile industry domestic enterprises activity under the current economic conditions. In order to realize this goal, one has to solve the following tasks: to define the essence of benchmarking, its specificity and stages of development as well as opportunities to apply to Ukrainian automotive industry enterprises.

The main material of the research. Benchmarking as the direction in the modern economy is a fusion of methods and management and marketing technologies, and is one of the fundamental business processes in modern companies, including automotive industry enterprises, allowing a systemic approach to identify key targets for its development and enhance the effectiveness of the corporate management. Being the major structural "technological bridge" in the management system, benchmarking allows to effectively detect risks and business opportunities and take them into account while building the business strategy in the company in a turbulent environment [11].

Benchmarking is the process to improve various strategic areas (including economic) that is based on an automobile industry company comparative strategic analysis with industry leaders, which consists in estimation of the own and sectoral efficiency, identification and studying of the industry leaders and implementation of results from the best examples in own activities. Benchmarking can be applied in all areas of the company (production and sales, marketing, logistics, etc.). However, it may give the best results in formation and implementation of a comprehensive economic strategy of automotive industry enterprise [4].

For the first time this method was developed in 1972 to assess the effectiveness by Institute of business strategic planning in Cambridge (USA). Over the next twenty years benchmarking has spread to most of the US and European companies. Benchmarking becomes an indispensable tool to ensure the implementation of the plan for a firm that is going to improve a production process or even the whole activity. In this case, the firm has to determine which company is on top of the competition, why own business is not the best in the industry. It has also to define what necessary is change or save in the company, how to implement the appropriate strategy to become the best of the best. In this sense, benchmarking helps to develop the potential of the company, including enterprises of automotive industry, and is the motivation production basis. The introduction of benchmarking allows to improve the planning, management and production of the automotive industry company and to increase

its competitiveness. It makes possible to know mistakes of others, minimizing own. Only a comparative analysis creates new productive and technological innovations in the automotive market [2].

The authors identify that the economic aspects of benchmarking products automotive industry enterprises should include:

- formation of the estimating comparative analysis with other objects and object-leader in economic parameters;
- analysis of the economic prerequisites research;
- identification of the estimation competitive advantages;
- setting of the estimation economic potential value.

However, the number of benchmarking products stages in enterprises automotive industry can be different. It can distinguish four basic steps:

- 1) definition of the problem and indicators choosing factors for comparison;
- 2) selection of the object for comparison and data collection;
- 3) analysis of information;
- 4) decision-making [13].

During the first stage “Definition of the problem and selection the indicators for comparison”, the automotive industry company has to formulate a problem that arises in the activity and which should be solved thanks to the same situation experience by another company. The main objective is the meaningful occurrence of the breaks periods and lag from the leaders in industry, research and analysis of their competitive advantages and consideration the possibility to adapt the changes in the company [13].

On the second stage “Selection of the object for comparison and data collection” is necessary to find a specific issue, to determine the best facility to which we plan to compare our automotive industry company. To detect the ethanol in particular industry such sources of information can be used:

- 1) industry seminars, congresses, exhibitions, consultants of chosen field;
- 2) professional conferences, associations, interviews with colleagues at informal situations;
- 3) consumer’s surveys, research competitors and industry analysis reports of foreign companies and others [13].

The third stage “Analysis of information” enables to analyze the received information, where an appropriate manager is responsible for conducting the comparative research and discovers causes of lag from the leader from the given automotive industry company [14].

The fourth stage “Decision-making” identifies causes of backwardness to automotive industry leader, you need to understand how to eliminate this backlog, and then make a decision [11].

It is also necessary to note one more important point: it is necessary to maintain a balance between the cost of found solutions implementation and their potential benefits in benchmarking. It is necessary to work out and weigh all the details, and only then to carry out certain activities. Now we consider how the benchmarking use can solve some problems on example of the automobile industry in Ukraine.

For each country, the car production is an important area in economy. The state of the auto industry in Ukraine is not in the best condition and is at a low level of competitiveness in comparison with foreign brands. Therefore, the existing situation made it necessary to “raise from knees” the Ukrainian automobile industry. As the car industry of Ukrainian cars is presented by the products of CJSC “Zaporizhia Automobile Building Plant”, which has full-scale cycle of passenger cars production, including stamping, welding, painting, body trim and

car assembly, we will consider the problems of this enterprise and seek solutions to solve them.

As the benchmarking is one of the most effective management tools in innovative enterprise development that showed good results after implementation in foreign companies, we will use its tools and methods to improve rankings and sales of CJSC “Zaporizhia Automobile Building Plant”. Today model lineup of CJSC “ZAZ” is presented by cars ZAZ VIDA, ZAZ Forza, ZAZ Lanos, ZAZ Sens as a sedan and hatchback. All of them are the traditional vehicles that work exclusively on fuel [6].

But the world has crossed this line and offers customers “green” cars that are very well established at the market and are in great demand among drivers. Today, the USA, Japan, China, the Netherlands, France, Norway, Germany, United Kingdom, Canada and Sweden are leaders in production of the electric cars (table 1). The dynamics of electric vehicles sales is very impressive: in the USA in 2014, the sales increased by 68,7%, in Japan – 46%, in China – and all at 115,6% [12].

Table 1 – Number of the electronic cars owners in 2014 in developed countries [12]

Country	The number of cars, units
United States	363 265
China	157 354
Japan	121 000
Norway	65 958
Netherlands	61 025
France	59 000
UK	39 616
Germany	38 154
Canada	14 429
Sweden	12 786

The electric vehicles have appeared at the Ukrainian market too, but they are of the foreign production. In order to boost sales and ratings of our CJSC “Zaporizhia Automobile Building Plant” as well as our country's economy, we offer CJSC “ZAZ” to move onto the issue of a separate line of domestic electric vehicles.

It will allow the Ukrainian drivers to buy and use a new generation of high-quality low-cost cars. In order to produce new better cars than its competitors do, and even surpass them, one has to implement benchmarking studies during development.

At first, it is necessary to find out which properties of existing electric vehicle in the market are the most attractive for consumers. Then one has to determine the best cars in its class for each of these properties, the level of which our domestic model will reach and surpass.

According to statistics for recent years in Ukraine, Tesla Model S, Nissan Leaf, Renault Fluence ZE, BYD E6 became the most popular electromobiles. Tesla Model S should be regarded as a competitor of Audi A7, Mercedes CLS, BMW 6 Gran Coupe, Porsche Panamera, not as a competitor to our traditional business sedans. That’s why we will not consider this model. Nissan Leaf (company “Nissan”, Japan), Renault Fluence ZE (company “Renault”, France) and BYD E6 (company “BYDLtd”, China) will be analyzed in our research work.

It should be noted that in addition to the analyzed models of vehicles with an electric motor at the Ukrainian market, there is the Chinese firm. Earlier these companies included those, produced by their car brands: BYD, Chery, Ssang Yong. The main feature of the marketing launch vehicles at the Ukrainian market is low prices, which is a major competitive advantage for Chinese autoproducers.

The authors improved methodical approach to evaluate the selection of vehicles with the best technical parameters based on benchmarking, which, unlike the existing ones, based on the calculation of the vehicles technical specifications integral factor in order to establish a better competitive product at automobile industry companies among evaluated. Let's explore them more thoroughly.

The first phase of this methodical approach is a comparative analysis of the technical characteristics in the analyzed vehicles. Experience shows that the automotive industry companies, which promote electric vehicles in the world markets for users, have several features, by which consumers evaluate and buy the new car (Table 2).

Table 2 – Evaluating of the potential competitors by some features [5; 7; 8]

Feature	Unit of measurement	NissanLeaf	RenaultFluence ZE	BYD E6
Maximum speed	km/h	145	135	140
The power reserve	km	228	160	300
Full-charge time	hours	9	8	6
Speed set time (from 0 to 100 km/h)	sec	10	13,4	9
Power	kW (l/s)	90 (110)	70 (90)	100 (121)
Torsional moment	H·m	280	226	450
Number of seats	seats	5	5	5
Dimensions (length, width)	mm	4445·1770	4748·1813	4560·1822

The second phase is characterized by improved methodological approach to score technical parameters of analyzed vehicles, produced by automotive industry enterprises. Using the method of scores, we define a leader in the automotive industry at the Ukrainian market (Table 3).

Table 3 – Defining the leader in the electric vehicle industry, scores (author's calculation)

Feature	Nissan Leaf	Renault Fluence ZE	BYD E6	Coefficient of weight
Maximum speed	3	1	2	0,05
The power reserve	2	1	3	0,25
Full-charge time	1	2	3	0,2
Speed set time (from 0 to 100 km/h)	2	1	3	0,05
Power	2	1	3	0,2
Torsional moment	2	1	3	0,05
Number of seats	3	3	3	0,1
Dimensions (length, width)	1	3	2	0,1
Total scores	16	13	22	1,0

According to this method, we define a leader in the electric vehicle industry. We will compare three cars of different brands and give them ratings from 3 to 1 (where 3 is excellent; 2 – good, 1 – a bad mark).

Coefficient of weight for each data plate was determined based on a survey conducted by potential customers' cars with an electric motor in one of the showrooms in Kyiv. And then the sum of these cars features is calculated and the best one is chosen.

The third stage in methodological approach is characterized by the choice of automotive company vehicle better technical parameters, based on the proposed integrated parameter of the technical characteristics in analyzed vehicles. The choice of the vehicle with the best technical specifications will be implemented through calculation of the integral index technical specifications for each car (I) (formed by author):

$$I = \sqrt[l]{\prod_{i=1}^n b_i^{v_i}}, \quad (1)$$

where n – number of indicators consisting of integral index; b_i – value of i -th index; v_i – weight of i -th index in system of indices, at provided $\sum v_i = l$.

Criterion to choose car with the best characteristics is the highest value of the integral index in the analyzed vehicles.

The calculation of the integral index concerning cars technical characteristics to determine the leader is:

$$I_{Nissan} = \sqrt{3^{0,05} \cdot 2^{0,25} \cdot 1^{0,2} \cdot 2^{0,05} \cdot 2^{0,2} \cdot 2^{0,05} \cdot 3^{0,1} \cdot 1^{0,1}} = 1,31. \quad (2)$$

$$I_{Renault} = \sqrt{1^{0,05} \cdot 1^{0,25} \cdot 2^{0,2} \cdot 1^{0,05} \cdot 1^{0,2} \cdot 1^{0,05} \cdot 3^{0,1} \cdot 3^{0,1}} = 1,20. \quad (3)$$

$$I_{BYD} = \sqrt{2^{0,05} \cdot 3^{0,25} \cdot 3^{0,2} \cdot 3^{0,05} \cdot 3^{0,2} \cdot 3^{0,05} \cdot 3^{0,1} \cdot 2^{0,1}} = 1,68. \quad (4)$$

According to this table and calculations of the integral index concerning cars technical characteristics, we can conclude that BYD E6 is the leader among available electric vehicles at the Ukrainian market by technical specifications. This model is the best electric vehicle according to its characteristics.

It can be a good example and ground for the development of our native car. The principal difference in the advanced benchmarking approach use is proposed by technical characteristics integral indicator of the analyzed vehicles through which the selection of the best offers competitive vehicle.

Our Ukrainian automobile industry enterprises should create a new car, which will be better, than its competitors produce, using features of the car above. Therefore, taking as an example a leader by technical specifications (BYD E6), CJSC “Zaporizhia Automobile Building Plant” needs to develop a draft of its electric vehicle, which will please Ukrainians. First of all, it is necessary to develop a project to create a competitive electric car. In order to remain results relevant, they need to be regularly updated and adjusted. Enterprise's leaders will be able to consider all the consequences of decisions, not only short-term effects associated with the change of products models through benchmarking.

Conclusions and perspectives for further researches. Thus, benchmarking can be

regarded as one of the most important areas in marketing oriented strategic research. Enterprises of automotive industry must develop activities to study the “best” products and marketing process, used areas competitors and companies working in similar areas to identify possible ways to improve their methods. It is believed, that the country’s economy will benefit through this experience sharing. Therefore, Ukrainian autoproducers adopt benchmarking method to stabilize the country and get out of the economic crisis.

Prospects for further research on this topic should concern the formation of methodological approaches to identify market segments for each electric motor car producing, based on price, quality and technical characteristics.

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Організаційні та економічні аспекти бенчмаркінгу інноваційної продукції підприємств автомобільної промисловості

У статті розглянуто поняття бенчмаркінгу, представлено етапи проведення бенчмаркінгу, досліджено ефективність використання бенчмаркінгу в роботі автовиробників. Розглянуто історичні аспекти виникнення методу бенчмаркінгу у світовій економічній науці. Визначено основні економічні аспекти проведення бенчмаркінгу в діяльності підприємств автомобільної галузі. Проаналізовано основні етапи проведення бенчмаркінгу інноваційної продукції в умовах сучасного розвитку продуктивних сил та впливу ринкових факторів на господарську діяльність компанії автомобільної галузі. Також розглянута необхідність використання бенчмаркінгу для підвищення конкурентоспроможності національного підприємства автомобільної

промисловості ЗАТ “Запорізький автомобілебудівний завод” та запропоновано обґрунтовані кроки для її підвищення. Проведено бенчмаркінгове дослідження електромобілів за їх технічними характеристиками з метою встановлення лідера за технічними характеристиками з досліджених марок електромобілів, що успішно реалізуються в Україні. Авторами вдосконалено методичний підхід до оцінювання вибору транспортного засобу з кращими технічними параметрами на засадах бенчмаркінгу, який, на відміну від існуючих, заснований на розрахунку інтегрального коефіцієнта технічних характеристик транспортних засобів з метою виявлення більш конкурентоспроможної продукції підприємств автомобільної галузі. На підставі проведеної реалізації вдосконаленого методичного підходу до оцінювання вибору транспортного засобу з кращими технічними параметрами на засадах бенчмаркінгу, авторами встановлено лідера серед досліджених марок електромобілів.

Ключові слова: бенчмаркінг, фаза, підприємство, електромобіль, автомобільна промисловість, оцінювання.

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Организационные и экономические аспекты бенчмаркинга инновационной продукции предприятий автомобильной промышленности

В статье рассмотрено понятие бенчмаркинга, представлены этапы проведения бенчмаркинга, исследована эффективность использования бенчмаркинга в работе автопроизводителей. Рассмотрены исторические аспекты возникновения метода бенчмаркинга в мировой экономической науке. Определены основные экономические аспекты проведения бенчмаркинга в деятельности предприятий автомобильной отрасли. Проанализированы основные этапы проведения бенчмаркинга инновационной продукции в условиях современного развития производительных сил и влияния рыночных факторов на хозяйственную деятельность компаний автомобильной отрасли. Также рассмотрена необходимость использования бенчмаркинга для повышения конкурентоспособности национального предприятия автомобильной промышленности ЗАО “Запорожский автомобилестроительный завод” и предложены обоснованные шаги для ее повышения. Проведено бенчмаркинговое исследование електромобилей по их техническим характеристикам с целью установления лидера по техническим характеристикам исходя из исследованных марок електромобилей, которые успешно реализуются в Украине. Авторами усовершенствован методический подход к оценке выбора транспортного средства с лучшими техническими параметрами на основе бенчмаркинга, который, в отличие от существующих, основан на расчете интегрального коэффициента технических характеристик транспортных средств с целью выявления более конкурентоспособной продукции предприятий автомобильной отрасли. На основании проведенной реализации усовершенствованного методического подхода к оценке выбора транспортного средства с лучшими техническими параметрами на основе бенчмаркинга, авторами установлено лидера среди исследованных марок електромобилей.

Ключевые слова: бенчмаркінг, фаза, підприємство, електромобіль, автомобільна промисловість, оцінювання.

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