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Boston Consulting Group Matrix: Opportunities for Use in Economic Analysis

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Abstract. Boston Consulting Group Matrix is the most popular methodological tool for analysing corporate portfolios. However, the method of using the Matrix has been frequently criticised, and the peak of popularity of this tool has passed. The purpose of this study is to find new areas of application for the Boston Consulting Group Matrix in the economic analysis of entrepreneurial activity. The following research methods were used: monographic, dialectical, abstract-logical, graphic, and tabular. It is shown that the use of the conventional BCG Matrix method is limited due to the ambiguity of conceptual foundations, methodological problems, and lack of complete information about the activities of competitors. The study proved that inaccuracies in the analysis of the market growth rate and the relative share of individual entities in it allow accurately assessing business prospects in this area. Methodological and applied issues arising when a company evaluates its market share of certain products are considered. A modification of the BCG Matrix is proposed, which distributes the assortment units of the analysed business entity according to certain profit growth reserves. Depending on the objects of a particular analysis, grouping in the modified matrix can be carried out according to individual types of products (goods, works, services) or by groups of buyers (consumers). The main problems with application of the BCG Matrix were clarified and systematised. Solutions for certain shortcomings of the conventional BCG Matrix were found, namely regarding the method for calculating the indicators it holds. A modification of the BCG Matrix is proposed, which classifies types of products (goods, works, services) by prospective profit reserves and changes in their share in the company's profit structure. A similar matrix is designed to classify buyers of goods or consumers of a company's services. The study figured out the place of the proposed BCG Matrix modification in economic analysis. The proposed variations of BCG Matrix have an advantage over the classical version, since they are based on internal analysis of only one subject of activity, and not on evaluating the potential of competitors. The developed modification of the analysis method can be integrated into the system of comprehensive economic analysis of any company. The results of the analysis using modified BCG Matrix can be used in financial strategic planning and marketing strategy development, specifically when planning advertising campaigns

Keywords: BCG Matrix, matrix approach, strategic analysis, revenue analysis, portfolio analysis, product range analysis

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INTRODUCTION

Boston Consulting Group Matrix is currently the most well-known methodological tool for analysing corporate portfolios using the matrix approach. The Matrix method was developed in 1968 by the founder of the well-known American firm Boston Consulting Group (BCG) Bruce Henderson and its employee Alan Zakon. The authors consider companies as a portfolio of products or businesses, each of which contributes to the growth of profitability, and which require strategic management. The essence of the method is to classify the assortment units of companies according to the growth values of the received cash flows and relative market share, followed by the recommendation of a development strategy for each group of units.

The method gained popularity with the publication of the works "The Product Portfolio" (1970) and "Perspectives on experience" (1970). For over 50 years, BCG Matrix has gained worldwide distribution and gained a reputation as the "gold standard" for analysing the company's product line. However, as the BCG itself admits, the peak popularity of this portfolio analysis tool has already passed.

Admittedly, many scientific and educational materials are devoted to the BCG portfolio analysis matrix. Of the recent publications analysing the methodological aspects of application and examples of using this method, scientific articles by researchers from the East attract attention. Thus, the study of the Vietnamese scientist Tien (2022) used the BCG Matrix to figure out the state of Dat Xanh in the real estate market and form its investment policy. Chinese scientists Zhang *et al.* (2021) used the Matrix to compare energy-saving technologies involved in the cement industry of China. Son & Park (2022) developed strategic recommendations based on the BCG Matrix to ensure Amazon's sustainable competitiveness. A group of scientists from Indonesia (Nurfitriya *et al.*, 2020) used this method to estimate the export market of certain West Java products (rubber, coffee, spices, etc.) and develop proposals for strategic planning of the region's economic development. Furthermore, the method was applied in the analysis of the aviation industry (Chang, *et al.*, 2019, Heiets *et al.*, 2021), ports (Mo, *et al.*, 2020), and Port Container Terminals (Chandrasekhar Iyer & Nihar, 2021), family firms (Belling, 2022), etc. The BCG Matrix method is currently used in various branches of social production, both at the micro- and macroeconomic levels. Kader & Hossain (2020) note that the BCG method is a valuable tool for evaluating which strategic units should be invested and which should be disposed of, which allows companies to effectively distribute available resources and manage their business.

At the same time, many scientists pay attention to the methodological shortcomings of analysing the portfolio of products based on the BCG Matrix. As Madsen (2017) notes, the BCG Matrix has been criticised on many occasions and, according to the researcher, is even discredited in academic circles. However, the scientist admits that many practitioners consider this method important in planning a corporate product portfolio.

BCG employees (Reeves *et al.*, 2014) tried to take a fresh look at Matrix. They admitted that the classical 1970 approach had lost its relevance due to two circumstances:

1) the modern business environment is changing rapidly, which requires fast response by accelerating the redistribution of resources between products;

2) market share is no longer a direct predictor of sustainable financial results.

The presence of these and other methodological and applied issues arising upon evaluating the assortment of a particular market subject dictates the relevance of further research of the BCG Matrix method.

The purpose of this study is to substantiate the recommendations for using the BCG Matrix method, provided that there is no complete information about the company's competitors in a particular market. The goals of this study are to further develop the critical analysis of the method, adapt the classical Matrix to the uncertainty of competitors' activities in the market, and modify this method depending on the objects of research.

MATERIALS AND METHODS

The idea to modify the classic BCG Matrix came from a practical need – while performing research on the order of a client who wished to remain anonymous, there was a problem with information about his competitors. One of the tasks set by the customer was to form recommendations regarding the company's assortment, the implementation of which was expected using a matrix approach. However, the use of the conventional BCG Matrix method proved impossible because the company had not one, but two main competitors and the lack of accurate data on the sales volumes of certain products by these competitors.

The study of the possibilities of using the BCG Matrix method without complete information about competitors was conducted in five stages. The first, theoretical stage, involved an in-depth study using the BCG Matrix monographic method developed by its authors, and suggestions for improving this method proposed by its proponents and critics. The source material for the study included scientific and popular science articles by scientists and practitioners from all over the world. Based on the dialectical approach and using the abstract-logical method, the features of the Matrix method were generalised, which narrow its practical use.

At the second stage, by brainstorming for each identified defect, a way to eliminate it was proposed. As a result of the examination, a modified version of BCG Matrix was proposed, which can be used if there is no one main competitor of the company in a particular market, and which is based on the search for internal reserves for increasing sales. The methodological framework for constructing a matrix is analytical grouping,

modelling, and the matrix approach. The third stage included finding, justifying, and calculating reserves for sales growth of particular types of products of the company that is the object of research. The work was performed using comparative analysis, analysis of relative dynamics indicators, expert method, and benchmarking. The next step was to test the proposed method based on the data of the customer company.

The following sources of information were used: statistical reporting of the company, data from its accounting and management accounting, results of marketing research, expert evaluation, etc. The conclusions of the study are formulated using methods of analysis and synthesis, induction, and deduction. According to the terms and conditions of the agreement, researchers have the right to publish the results obtained only with the consent of the customer company. The latter allowed the partial publication of the results obtained and without specifying its name. Thus, the data and calculations of using the BCG Matrix presented in this paper will be considered a conditional illustrative example constructed using the idealisation technique. At the final stage of this study, the results were clearly illustrated using graphical and tabular methods.

RESULTS AND DISCUSSION

The main theoretical and methodological foundations of the BCG Matrix are described on the official website of the Boston Consulting Group (2022). The BCG Matrix is also called "The growth share matrix" – this name reveals the essence of the method – the division of the company's assortment units into categories according to market growth criteria and market share to decide on investment priorities in each of the categories. As assortment units (other name variants – businesses, business units, strategic units, products), individual products (goods, securities, services, areas of activity), brands or firms that together form the portfolio of a given company can be investigated. As noted by members of the Management Study Guide content (2022) team and A. Upadhyay (2022), the total market volume is more often measured in cash receipts, but it can also be measured in natural units. The relative market share of a business is found by dividing current-year sales by current-year sales of the main competitor. The market growth rate is defined as the percentage of current-year sales to last-year sales.

Graphically, categories are represented as a matrix divided into four sectors. Each cell of the matrix clearly stands for different types of business and is indicated by a certain symbol.

According to the official website of Boston Consulting Group (2022), the BCG Matrix names the following business categories:

1. "Cash cow" – characterised by a prominent market share and low market growth rates. These are the main generators of cash receipts, which are the main source of the company's current prosperity. Their management is aimed at maximising current profits with small investments. The main strategy for such products is to support the existing market share without expanding operations.
2. "Star" – future sales leaders characterised by high sales growth rates and a high market share. They have sales potential with investment, and considerable resources are distributed for their development. "Stars" are the future of the company, but only for a certain time.
3. "Question mark" (or "difficult child") – a high market share, but low sales growth rate. They require more investment than they generate cash. They should be controlled as much as possible and developed only if investment opportunities are available.
4. "Pet" (for the most part, this category is represented by the "dog" symbol) – small market share and small growth prospects. They are useless, and traditionally liquidation or sale strategies are recommended for such products.

The BCG Matrix distributes products according to the product life cycle model, according to which any product goes through four stages of development: market entry ("Question mark"), growth ("Star"), maturity ("Cash cow"), and decline ("Pet").

Gunasekarage *et al.* (2020), Chiu & Lin (2020) describe some practical aspects of matrix construction. In the matrix, the horizontal axis shows the market share that each product occupies, and the vertical axis shows the growth rate of this product. For each product, a circle is constructed on the matrix field, the size of which corresponds to the volume of cash flows from this product. The upper part of the matrix shows business units whose growth rates are higher than the average growth rate of the corresponding market, while the lower part shows those with lower growth rates, respectively. In the original model, the average growth rate, which is the limit of high and low rates, is 10% market growth per year. The left part of the matrix shows products with a "high" market share of the business – more than 1.0, i.e., the company's share exceeds the equal share of the main competitor.

Here is an example of the BCG Matrix. As noted above, the name of the company whose factual material is used as an illustration of the method is not disclosed under the terms and conditions of the agreement for consulting. The company sells oil on the local market, namely: cold-refined sunflower oil (showed in Figure 1 as A), extra-pressed sunflower oil (B), unrefined sunflower oil (C) and olive oil Extra virgin olive oil (D) Virgin olive oil (E), Olive oil (F).

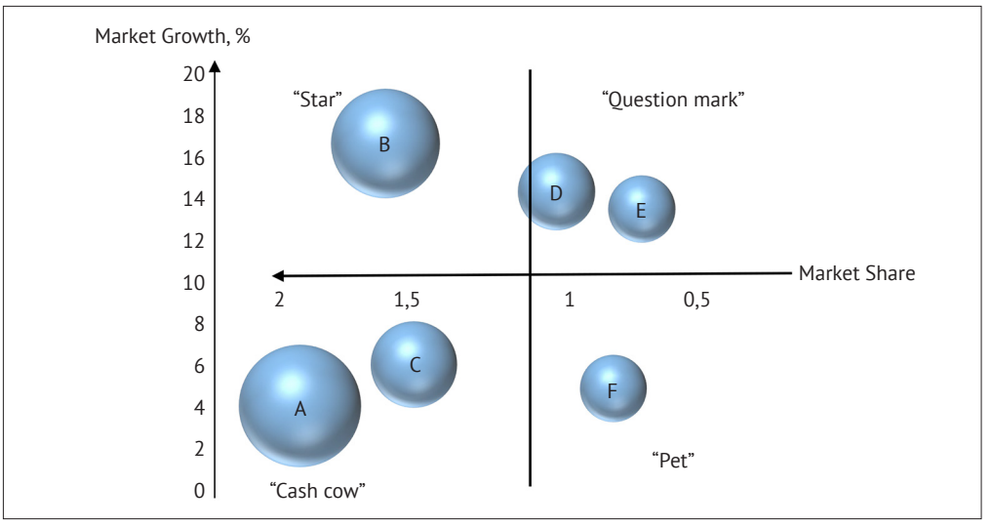

***Figure 1**. The BCG Matrix of the company*

***Source:** compiled by the authors*

In practice, there may be situations when a certain product category does not include any product range, e.g., if the company has already optimised its portfolio and does not have "Pet" products. This situation occurred in the practical activities of the authors, as well as its possibility is noted by researchers from the teams "Prachi Juneja" and Management Study Guide Content (2022). Building a BCG Matrix is not the usual grouping of assortment units by the degree and direction of change in profitability compared to the earlier period and with competitors. The classification is based on conceptual propositions, which are summarised and critically characterised in Table 1.

***Table 1**. Conceptual foundations of the BCG Matrix and their critical evaluation*

Theoretical position	Critical assessment of the situation
Cash flow is an indicator of business success	A business can generate a lot of revenue, but it can be low-profit or unprofitable due to considerable costs. The financial success of a business is figured out by net cash flow and profit. Furthermore, a low-income (or low profit) business unit can increase the profits of a related business due to the synergy effect (e.g., if buyers prefer a seller who has a full range of product group lines, or if the product is made from waste or a lack of main production)
Cash flow depends on the company's market share. The relative market share characterises the company's competitiveness	The regulation is generally valid, the market leader has price advantages and experience, with an increase in the scale of production, variable costs per unit of production are minimised, which contributes to profit growth. But in practice, there are limitations, which include as follows: 1. A business may be outside the standard competitive field, e.g., run in the "blue ocean" or be a monopolist, but not receive super-profits due to inefficient management or state regulation of the market. 2. Cash flow depends on the volume of the market, even the position of a leader in a limited market does not guarantee an increase in sales. If a firm sells products on the local market and does not have the potential to reach wider markets, then sales volumes are limited by effective demand for these products. Furthermore, some specific products (e.g., components to produce spacecraft or medicines for a rare disease) have a limited number of buyers or consumers, whose limited needs depend on sales volumes. 3. One of the ways to increase market share is to reduce the price, so in the short term, the growth of market share may not be accompanied by an increase in cash flows. 4. When calculating the share of a business in a particular market, the value that is compared (the numerator of the fraction) is the indicator of income (cash flow). That is, in the model of the relationship between market share and cash flow, the latter is considered both as a factor of influence and as a result of the influence of this factor
Cash flow depends on the growth of this market. The growth of the market dictates its attractiveness for the company	Undoubtedly, the first-order factor affecting future earnings is the prospects for market growth or contraction. However, a long-term assessment of market development, like forecasting any other process, is probabilistic in nature, and therefore cannot be precise. Furthermore, stable markets that show neither growth nor contraction are also attractive
Use of two parameters in the analysis (market share and market growth rate)	Reducing the criteria for evaluating the effectiveness of an assortment portfolio to two parameters simplifies its use. However, the model does not consider other key factors that affect performance, such as the impact of prices, production costs, the ability to adapt to rapidly changing circumstances, macroeconomic indicators, the efforts of competitors in the market, etc.

Table 1, Continued

Theoretical position	Critical assessment of the situation
Only retrospective information is used in calculating the evaluation parameters	Of the two matrix parameters, one (market share) is static, i.e., it is figured out only for the last year, and the other (market growth rate) evaluates the dynamics only in the studied year compared to the previous one. The annual analysis period is, on the one hand, too short, since data for one year is almost always biased, on the other hand, it is too long, since it does not allow quickly responding to changes in the situation. The method does not make provision for added research on the prospects for changing the parameters of the model, the strategic potential of the company, and therefore cannot be considered predictive. In particular, the method does not provide an estimate of the duration of the product life cycle stage – for instance, the Matrix does not answer the question of how long "cash cows" will generate income, or when a "star" will become a "cash cow"

Source: *developed by the authors based on (BCG Matrix, 2020; Nurfitriya et al., 2021; Özemre & Kabadurmus, 2020)*

The main issues arising upon constructing the BCG Matrix are related to the ambiguity of the following methodological and practical aspects of the method:

1. Lack of clear criteria for assigning a company's business to a particular market.

Local, regional, national, and global markets are distinguished beyond geographical boundaries. However, the BCG method does not provide recommendations on how to analyse a business if, for instance, a product is sold in the domestic national market and the markets of several countries located on different continents, while the market share and their potential differ. Or, given that there are different markets for objects, what is the best way to explore soy tofu cheese – as a component of the vegan cheese market, or to factor in that it is not consumed by vegetarians exclusively?

2. Availability of alternative methods for calculating the product's market share, each of which is not methodically perfect.

There are two methods that are methodically correct in figuring out the share that a company's product occupies in the total product market:

– divide the total revenue from the sale of a given company's product by the total revenue from the sale of that product to all sellers. Problems that arise when using this method – income can be measured in different currencies, and their conversion into a single currency causes inaccuracies due to exchange rate differences; income depends on price fluctuations that can be caused by random, objective circumstances or subjective reasons; lack of complete information about total income due to shortcomings in official statistics, the presence of the shadow economy, "pirate markets", state and trade secrets, etc.;

– the amount of product sold by this company is divided by the total amount of product sold on the market. Disadvantages of the method – measurement in natural units does not objectively estimate the income (e.g., the income from the sale of one painting by a recognised artist may exceed the income from the sale of hundreds of paintings by an unknown artist) and the above disadvantages of sales statistics.

In practice, when figuring out the market share of a business, the approach described above is most often used – the company's income from the sale of a product divides the income from the sale of this product to the main competitor. According to the authors, the indicator calculated in this way cannot fully reveal the company's competitiveness because it does not factor in the number of competitors. Often, the competition in the market is strong, and it is difficult to find the main one among 2-3 strong competitors. It is also difficult for a leading company to find the main competitor among market outsiders with insignificant sales, the volumes of which do not differ substantially. Another issue is the need to obtain objective information about competitors' sales since data can be hidden and distorted in open sources.

3. There is no unambiguous quantitative criterion for classifying a product as a "high" or "low" market share.

In the classical matrix, the methodology of which is described on the BCG website, the standard is a coefficient of 1.0, i.e., the company's share is equal to the competitor's share, but if it exceeds 1, then the business share is considered "high". However, considering the shortcomings of the calculation of the "market share" indicator, this approach is not dogmatic, it can be revised. In an oligopoly, the first three companies to cover 80% of sales are usually considered market leaders. In this situation, the share of each of these companies can be considered high. Furthermore, there may not be a leader in the market, or vice versa, the leader of an innovative product may temporarily be a monopolist.

4. It is insufficient to compare indicators for only two years to estimate market growth.

A common way to calculate the growth rate is the ratio of a company's revenue from current-year product sales to last-year revenue, expressed as a percentage. However, it is necessary to agree on this formula to further use this indicator – based on the dynamics in the past, determine the phase of the product life cycle and predict revenues for the future. To achieve this, one needs to evaluate the trend, and not just compare data for two years. Therefore, the "market growth rate" indicator should be calculated at least three years in advance, and the predicted extrapolated value of the indicator should be factored into the BCG Matrix.

Since not all markets are growing, it is more correct to use the term "rate of market change" instead of the term "market growth rate" for products that are at the stage of decline.

5. There is no unambiguous quantitative criterion for classifying a product as a business with a "high" or "low" growth rate.

In the original BCG Matrix classification, B. Henderson (1970) set the boundary between "high" and "low" product growth rates at 10% market growth per year. However, the limit level is not immutable and can be reviewed by the analyst. According to the recommendations of T. Kaufmann (2021), this level should not be set below 5% or the level of growth of the economy (industry). Some analysts (Heiets *et al.*, 2021) take the growth rate as a benchmark, calculated based on statistical data from open sources on total revenues from the sale of a given product on the market. Some scientists (Mo *et al.*, 2020) calculate the growth rate based on the revenues of leading companies. In the latter case, there is again an already defined problem with information about competitors' revenues and total sales in the market.

It is considered that in cases where it is impossible to obtain objective information about the market of a particular product, or if a new product is being analysed, the market of which has not yet formed, or a new company that does not yet have a basis for comparing its revenues, the classical BCG Matrix approach can be used in a modified form.

The authors of this suggest using the BCG Matrix classification to summarise the results of the analysis for finding profit growth reserves for the main assessments of the company's potential and the market. It is generally recognised that an important task of economic analysis is the search for reserves to increase the efficiency of activities, to mobilise opportunities to enhance the effect of positive and neutralise negative factors to improve financial results. Each business entity periodically determines the areas of increasing revenues, optimising production costs, and calculates the impact of implementing these reserves on financial results. Admittedly, different reserves bring different economic effects – some do not require considerable investment, but are less effective, while others require considerable investment, but give a greater effect. Furthermore, the amount of added profit that can be obtained from assorted products also varies – some have a considerable real potential for substantial profit growth, while some, on the contrary, have almost completely exhausted their capabilities. A detailed description of the method for finding reserves to increase profitability is not part of the tasks of this study. The authors consider only how the results of such an analysis can be generalised using the BCG Matrix approaches.

The authors offer to divide the assortment units of products (goods, works, services) into the following categories:

1) "Cash cow" – products that currently bring considerable profit, but do not have the potential for its growth. In other words, these are currently strategically important products, the main profit generators, but there are no real prospects for its substantial increase yet. Since such a business is already set up, the cash flow is well-balanced, and it does not require considerable investments. Managing such a business is aimed at maximising current profits with small investments. The main strategy of action in the market is "harvesting" – supporting an existing position without trying to expand its activities.

2) "Rising star" – promising products, future sales leaders that have considerable potential not only for sales growth, but also for substantial profit growth. These are usually new products that can considerably increase returns with a large investment. It is expedient to direct the profit received from the "cash cows" to the development of a "rising star", it is also possible to use the funds raised, namely bank loans.

3) "Dark horse" ("question mark") – products that currently bring little profit but have the potential to increase it. They are distinguished from "Rising stars" by the following features: the development of such a business needs investments that have a long payback period, there is intense competition in the market, there is a considerable investment risk or there are factors that increase uncertainty in increasing profits or at least the return on investments. Since these are assortment units with a high degree of uncertainty about future profitability, one should invest in their development with caution and only if funds are available.

4) "Lame duck" – products with low or zero profit or loss. These are unpromising types of products for which no real reserves for improving financial results were found. However, it is not always necessary to get rid of these products, they can give added competitive advantages, be necessary components of the company's assortment policy, etc. It is merely necessary to minimise their presence, try to eliminate the impact of negative factors on the results of activities.

To set a quantitative limit for assigning a product to a particular category, the authors of this study offer the following options:

– to decide a significant or insignificant contribution of product profit to the total profit of the company, set either a 10% barrier or use the principle of ABC analysis, wherein products with a significant contribution are considered to be those assortment units that are leaders in profitability and collectively give 80% of profit.

– to find a significant or insignificant rate of profit growth prospects, set either a 10% barrier or an average value of the potential profit growth rates of all the company's products.

The proposed version of the Matrix differs not only by the considered methodological features of assigning assortment units to squares of matrices, but also by the location of categories on the scale – in a two-dimensional coordinate system with the direction of movement from a smaller (low) to a larger (high) value.

Next, the study considered the technique of applying the Matrix on the example of the aforementioned

company, which sells sunflower and olive oil on the local market and plans to start selling corn oil. The analysis of profit increase reserves gave the following results (Table 2).

***Table 2**. Summary of the company's profit growth reserve search results*

Types of products (oil)	Last year's profit, thousand dollars	Last year's profit structure, %	Reasonable profit next year, thousand dollars	Reasonable profit structure for the next year, %	Prospects for profit growth, %	Sector in the Matrix
A – cold refined sunflower oil	544	32.0	600	27.3	+10.3	"Cash cow"
B – first-pressed sunflower oil	348	20.5	400	18.2	+14.9	"Cash cow"
C – unrefined sunflower oil	320	18.8	350	15.9	+9.4	"Cash cow"
D – Extra virgin olive oil	212	12.5	400	18.2	+88.7	"Rising star"
E – Virgin olive oil	179	10.5	200	9.1	+11.7	"Lame ducks"
F – Olive oil	97	5.7	100	4.5	+3.1	"Lame ducks"
G – corn oil	–	–	150	6.8	×	"Dark horse"
Total	1700	100.0	2200	100.0	+29.4	×

***Note:** The colour indicates the types of products classified as "high" according to the established criteria and boundaries.*
***Source:** compiled by the author*

As Table 2 shows, the company sees reasonable opportunities to increase its profit by 29.4% (in value terms by 500 thousand dollars). Therewith, a higher-than-average growth rate for the company is expected from the sale of Extra virgin olive oil (an increase of 88.7%). It is impossible to figure out the rate of profit growth for a new product – corn oil, but the authors of this study believe that in such cases the product can be attributed to "Dark horse". Other types of products are also expected to show profit growth, but its pace will be less than the company's average. If one takes the average possible growth as a standard, then all other products of the company should be considered business units with a low growth rate. If one chooses the option according to which the growth standard is 10%, then there will be as many as three "stars". According to reasonable amounts of profit in the coming year, products with a high share in the profit structure (over 10%) are A, B, C, D – together they will bring 80% of the profit.

Figure 2 shows a modified BCG Matrix summarising the results of the assessment of assortment units according to profitability indicators. As in Table 1, the average possible profit growth for the company is 29.4% (for a more visual representation, this indicator is rounded up to 30%). The size of the circle is proportional to the potential share of the product's profit in the total amount of profit.

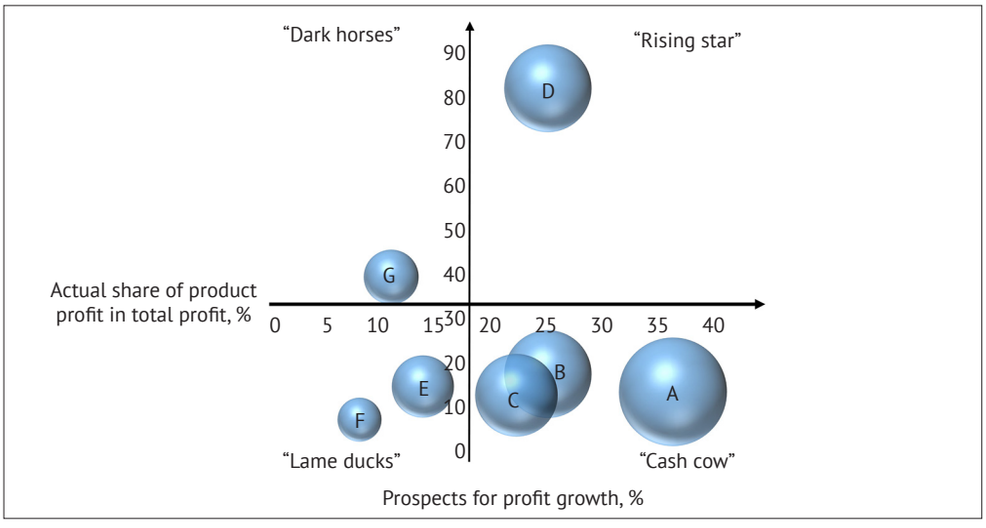

***Figure 2**. The BCG Matrix of the company for evaluating product range units based on real and prospective profitability indicators*

***Source:** compiled by the authors*

It is also suggested to use the BCG Matrix when planning advertising campaigns for the typology of population categories. Currently, such a recommendation is only a conceptual idea that has not passed practical testing. However, subject to detailed elaboration, such an approach can serve as one of the elements of developing the idea of an advertising strategy and directions for its financing.

Based on the results of marketing surveys, one can distinguish separate groups of respondents who have different degrees of interest in this product. Groups should be identified according to the key socio-demographic characteristics (e.g., urban youth, pensioners, residents of a particular region), etc.

According to the BCG Matrix modification, the following groups of individuals can be distinguished in relation to the product under study:

– "regular customers" ("cash cows"). These are long-time supporters of the product, who usually buy it. It is regular customers who bring a stable profit, but their needs are limited, they will not buy a larger amount of product, and therefore will not be able to provide a substantial increase in profit. To support the attention of regular customers to the product, one does not need focused active advertising, just a general reminder ad is enough.

– "perspective categories" ("stars"). Categories of the population that can potentially become regular customers because they are interested in a product may be consumers of a similar product. The main growth in product sales and revenue from its implementation can ensure that these promising categories are favoured. It is these groups of the population that should be targeted with focused advertising adapted to a particular category (e.g., advertising designed for middle-aged or older women living in small localities).

– "dark horses" ("question marks") – people who have not decided on a choice and do not have a definite opinion about the product. There is a chance that they will be interested in the product, but it is difficult to decide in advance whether they will become regular customers and substantially affect future profits. One can only distribute funds for an advertising campaign aimed at these categories if there is sufficient funding.

– "unpromising categories" that are unlikely to become regular customers under any circumstances.

Comparison of the results of the authors' study with the results of a study by other scientists on the shortcomings of the BCG Matrix and ways to eliminate them indicates a considerable interest in this issue.

Although the Austrian scientist Kaufmann (2021) calls this method "the mother of portfolio concepts in the business sphere", he notes that the evaluation criteria in it are reduced to only two aspects. Therefore, the matrix can only be used to compare individual products, and not whole business areas. The researchers of the Prachi Juneja and Management Study Guide Content (2022) teams agree with the existence of this issue. They find other shortcomings in the method under study, namely they note that the four-element approach is too simplified; the classification has the concepts of "high" and "low" types of business, but there are no "medium" ones; the market for which the comparison is made is not clearly defined; a considerable market share does not always bring large profits, etc.

The authors of this study agree with Chiu & Lin (2020), who note that the conventional BCG matrix does not consider different periods to compare the growth and relative market share of products and suggest extending the period for analysis. Svichkar (2019) notes the following disadvantages of the method: it analyses only achieved results, not future indicators; it is intended for use by companies that are or strive to be leaders; it does not consider the strategic potential of the company, etc.

Nowak *et al*. (2020) proposed the BCG matrix add-on, which was called the Grey Portfolio Analysis method. The authors try to solve the generally recognised problem regarding the static nature of the conventional methodology by using predictive models of the Grey Portfolio Analysis. Researchers believe that when using grey numbers, the issue of information uncertainty is solved at the methodological level.

R. Debasish (2020) considers the Matrix method from unusual angles. He contemplates whether there is a statistically significant correlation between the market growth rate and the relative market share of the leading company and its closest competitor. The availability of a sufficient statistical base allows clearly classifying market participants and deciding the nature of their risk. The proposal to use the generalising BCGI index in the BCG Matrix method for comparative analysis is also worthy of attention.

To overcome the issue of information uncertainty, Özemre & Kabadurmus (2020) used modern Big Data analytics methods for strategic analysis of the international market. It is impossible to disagree with the thesis that modern software can predict the volume of international trade and facilitate the strategic decision-making, providing information about the future of global markets.

Despite the highlighted problems in the BCG Matrix concept, the idea of using a balance between types of businesses that are at various stages of the life cycle for the sustainable development of the company was without exaggeration revolutionary for its time and is still relevant. However, the problems of the BCG Matrix method are not limited to the ambiguity of the conceptual approaches considered. There are some methodological inconsistencies that need to be clarified, as well as practical difficulties. The essence of the latter is that successful application of the Matrix requires comprehensive knowledge of the market and its competitors, but it is not always possible to obtain it.

CONCLUSIONS

One of the tasks facing economic analysis is to evaluate the structure of financial results, find industries, types of products with the most substantial impact on the formation of profits and losses, and figure out the areas for increasing profitability. Analysis of reserves for improving financial results allows finding the types of products (goods, works, services) that have the best prospects, and the use of a modified BCG Matrix allows finding those products that require priority attention and the greatest resources to increase profits.

The proposed variations of the BCG Matrix have an advantage over the classical version, since they assess the prospects not for income, but for profit (which is more important for the business) and are based on internal economic analysis of only one business entity. Accordingly, there is no need to estimate the potential of competitors in the market of a certain product (service), which is inevitably inaccurate due to incomplete information.

Furthermore, ways to eliminate certain shortcomings of the conventional BCG matrix are proposed, namely regarding the methodology for calculating the indicators included in it. The proposed method of using the BCG Matrix is a tool for prospective analysis and can be integrated into the system of comprehensive economic analysis of any company. The results of the analysis using the modified BCG Matrix can be used in financial strategic planning and marketing strategy development, specifically when planning advertising campaigns.

REFERENCES

[1] Upadhyay, A. (2022). *What is BCG Matrix? – Examples & how-to guide*. Retrieved from https://www.feedough.com/what-is-a-bcg-matrix-examples-how-to-guide.
[2] BCG Matrix – meaning and its limitations. (2022). Retrieved from https://www.managementstudyguide.com/bcg-matrix.htm.
[3] Bellandi, F. (2022). Further developments of the financially-ESG sustainable growth matrix. *International Journal of Business and Management*, 17(2), article number 112. doi: 10.5539/ijbm.v17n2p112.
[4] Belling, M., Pidun, U., zu Knyphausen-Aufseß, D. (2022). Restructuring in family firms: Balancing family objectives and economic prosperity. *Long Range Planning*, article number 102184. doi: 10.1016/j.lrp.2022.102184.
[5] Boston Consulting Group. (1970). *Perspectives on experience*. Boston: The Boston Consulting Group.
[6] Boston Consulting Group. (2022). *What is the growth share matrix?* Retrieved from https://www.bcg.com/about/overview/our-history/growth-share-matrix.
[7] Burke, G.T., & Wolf, C. (2020). The process affordances of strategy toolmaking when addressing wicked problems. *Journal of Management Studies*, 58(2), 359-388. doi: 10.1111/joms.12572.
[8] Chandrasekhar Iyer, K., & Nihar, V.P.S.N. (2021). Concentration analysis of container terminals in India. *Maritime Transport Research*, 2, article number 100037. doi: 10.1016/j.martra.2021.100037.
[9] Chiu, C.C., & Lin, K.S. (2020). Rule-based BCG Matrix for product portfolio analysis. In R. Lee (Ed.), *Software engineering, artificial intelligence*, (pp. 17-32). Cham: Springer. doi: 10.1007/978-3-030-26428-4_2.
[10] Debasish, R. (2020), Formulation of BCG Index (BCGI): An empirical study on wal-mart and Amazon. *Journal of Transnational Management*, 25(1), 30-56. doi: 10.1080/15475778.2019.1702437.
[11] Dorohan-Pysarenko, L., Rębilas, R., Yehorova, O., Yasnolob, I., & Kononenko, Z. (2021). Methodological peculiarities of probability estimation of bankruptcy of agrarian enterprises in Ukraine. *Agricultural and Resource Economics*, 7(2), 20-39. doi: 10.51599/are.2021.07.02.02.
[12] Dorohan-Pysarenko, L., Yehorova, O., & Panchenko, I. (2020). The features of analysis of efficiency of implementation technological innovations in agriculture. *Science and Innovation*, 16(3), 25-35. doi: 10.15407/scin16.03.025.
[13] Fernández-Vidal, J., Reyes, G.-R.M., Gascó-Gascó, J.L., & Llopis-Taverner, J. (2022). Corporate portfolio management in practice: The case of credit suisse's turnaround. *Direccion y Organizacion*, 76, 69-83.
[14] Gunasekarage, A., Luong, H., & Truong, T.T. (2020). Growth and market share matrix, CEO power, and firm performance. *Pacific-Basin Finance Journal*, 59, article number 101257. doi: 10.1016/j.pacfin.2019.101257.
[15] Hauschild, M. (2020). Product portfolio analysis towards operationalising science-based targets. *Procedia CIRP*, 90, 377-382.
[16] Heiets, I., Oleshko, T., & Leshchinsky O. (2021). Airline-within-Airline business model and strategy: Case study of Qantas Group. *Transportation Research Procedia*, 56, 96-109. doi: 10.1016/j.trpro.2021.09.012.
[17] Henderson, B. (1970). *The product portfolio*. Boston: The Boston Consulting Group.
[18] Hensmans, M. (2019). A New matrix for building platform portfolios: How companies can sustain their leadership. *Journal of Business Strategy*, 42(3). doi: 10.1108/JBS-08-2019-0162.
[19] Kader, M.A., & Hossain, H. (2020). An analysis on BCG growth sharing matrix. *International Journal of Economics, Business and Accounting Research*, 4(01).
[20] Kaufmann, T. (2021). Marktwachstums-Marktanteilsportfolio (BCG-Matrix). In *Strategiewerkzeuge aus der Praxis* (pp. 233-240). Heidelberg: Springer Gabler. doi: 10.1007/978-3-662-63105-8_22.

[21] Khajezadeh, M., Niasar, M.S.F., Asli, S.A., Davari, D., Godarzi, M., & Asgari, Y. (2019). Application of neural network in portfolio product companies: Integration of Boston Consulting Group matrix and Ansoff matrix. *International Journal of Economics and Management Engineering*, 13(6), 821-825.
[22] Madsen, D. (2017). Not dead yet: The rise, fall and persistence of the BCG Matrix. *Problems and Perspectives in Management*, 15, 19-34. doi: 10.21511/ppm.15(1).2017.02.
[23] Nurfitriya, M., Koeswandi, T.A.L., Fauziyah, A., & Budiman, A. (2021). West java leading product position: BCG Matrix analysis. *Global Conference Series: Social Sciences, Education and Humanities*, 7. doi: 10.32698/ICRED.0482.
[24] Özemre, M., & Kabadurmus, O. (2020). A big data analytics based methodology for strategic decision making. *Journal of Enterprise Information Management*, 33(6), 1467-1490.
[25] Pulubuhu, M., Kadir, A.R., & Sobarsyah, M. (2022). Analysis of business strategy in improving product marketing. *Hasanuddin Journal of Business Strategy*, 4(1), 1-12.
[26] Semenchuk, T., & Vasiliha, S. (2020). Application of management matrix models for strategic planning of enterprise activities. *Technium Social Sciences Journal*, 8, article number 398.
[27] Shahrbabaki, A.A., Sakkaki, S., Parsa, P., Heidary, M.S., & Pour, V.Y. (2020). Strategic reactions to information content of dividend change: Applying BCG growth share matrix when signalling hypothesis identified. *Entrepreneurship and Sustainability*, 8(2), 10-32. doi: 10.9770/jesi.2020.8.2(1).
[28] Son, M.S., & Park, S-H. (2022). Securing Amazon's sustainable competitiveness and strategic analysis: Based on the BCG matrix and 6C development strategy. *KBM Journal*, 6(1), 83-97.
[29] Soo, W.M., Kwang, B.L., Yong, J.L., & Hong, G.P. (2020). Analysis of import changes through shift-share, location quotient and BCG techniques: Gwangyang Port in Asia. *The Asian Journal of Shipping and Logistics*, 36(3), 145-156. doi: 10.1016/j.ajsl.2020.01.001.
[30] Svichkar, N. (2019). The use of modern methods of strategic analysis to improve the international competitiveness of enterprises. *Market Infrastructure*, 29, 595-601.
[31] Tien, N. (2022). Business analysis for Dat Xanh real estate group based on BCG matrix. *International Journal of Multidisciplinary Research and Growth Evaluation*, 03(02), 344-351.
[32] Yahya, I., Khatami, G., & Al Khansa, T. (2020). Development strategy analysis of fertilizer company using BCG Matrix method. *Science and Engineering*, 851(1), article number 012015.
[33] Chang, Yu-Ch., Lee, W-H, & Wu, Ch.H. (2019). Potential opportunities for Asian airports to develop self-connecting passenger markets. *Journal of Air Transport Management*, 77, 7-16. doi: 10.1016/j.jairtraman.2019.02.001.
[34] Zhang, Y.C., Gong, X.Z., Liu, Y., & Zhou, L.W. (2021). Screening of energy-saving technologies for cement production based on Boston Consulting Group Matrix. *Materials Science Forum*, article number 1035. doi: 10.4028/www.scientific.net/msf.1035.988.

Boston Consulting Group matrix: можливості використання в економічному аналізі

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Анотація. Boston Consulting Group Matrix є найвідомішим та популярним серед практиків методичним інструментом аналізу корпоративного портфеля. Проте, методика використання Matrix зазнала чисельної критики, а пік популярності цього методичного інструменту минув. Метою статті є визначення нових напрямів використання Boston Consulting Group Matrix в економічному аналізі підприємницької діяльності. Використані наступні методи дослідження: монографічний, діалектичний, абстрактно-логічний, графічний і табличний. Обґрунтовано, що використання традиційної методики BCG matrix обмежене внаслідок неоднозначності концептуальних засад, методичних проблем та браку повної інформації щодо діяльності конкурентів. Доведено, що неточності в аналізі швидкості росту ринку та відносної частки на ньому окремих суб'єктів, унеможливлюють точність оцінки перспектив бізнесу у цій сфері. Розглянуто проблеми методичного та прикладного характеру, які виникають при оцінці компанією її частки на ринку певних продуктів. Запропоновано модифікацію BCG matrix, яка розподіляє асортиментні одиниці аналізованого суб'єкта діяльності за визначеними резервами зростання прибутків.

Залежно від об'єктів конкретного аналізу групування у модифікованій матриці може здійснюватися за окремими видами продукції (товарів, робіт, послуг) або за групами покупців (споживачів). Уточнені та систематизовані основні проблеми, які виникають при застосуванні BCG matrix. Визначені шляхи щодо усунення окремих недоліків традиційної BCG matrix, зокрема, щодо методики розрахунку показників, які входять до неї. Запропонована модифікація BCG matrix, що класифікує види продукції (товарів, робіт, послуг) за перспективними резервами прибутків та за зміною їх частки у структурі прибутку компанії. Аналогічна матриця розроблена для класифікації покупців товарів або споживачів послуг компанії. Визначене місце запропонованої модифікації BCG matrix в економічному аналізі. Запропоновані варіації BCG matrix мають перевагу у порівнянні з класичним варіантом оскільки вони базуються на внутрішньому аналізі лише одного суб'єкта діяльності, а не на оцінюванні потенціалу конкурентів. Розроблена модифікація методики аналізу може вбудуватися у систему комплексного економічного аналізу будь-якої компанії. Результати аналізу з використанням модифікованих BCG matrix можуть бути використані у фінансовому стратегічному плануванні та у розробці маркетингової стратегії, зокрема при плануванні рекламних кампаній

Ключові слова: BCG matrix, матричний підхід, стратегічний аналіз, аналіз доходів, портфельний аналіз, аналіз асортименту