ADEQUATE ASSESSMENT OF COMPETITIVE ADVANTAGES THROUGH PORTER'S DIAMOND. APPLICATION TO BULGARIAN NON-FERROUS METALLURGY

Dimitar Nedelev, Georgi Kondev

University of Chemical Technology and Metallurgy
8 Kliment Ohridski Blvd, Sofia 1797, Bulgaria
E-mail: kondev@uctm.edu

Received 14 June 2024
Accepted 20 September 2024
DOI: 10.59957/jctm.v59.i6.2024.5

ABSTRACT

The topics of competitive advantages and competitive strategies of the enterprise in the wine sector are becoming more and more relevant these days, given the fact that most enterprises operate under conditions of high competition and minimal amount of resources. Competitive advantages and competitive strategies are precisely one of the main processes that make the enterprise profitable, successful and profitable. The main objective of the present paper is to examine the importance of competitive advantages and competitive strategies for the metallurgical enterprise. An adequate assessment of competitive advantages through Porter's Diamond Model involves analyzing the four key elements - factor conditions, demand conditions, related and supporting industries, and firm strategy, structure, and rivalry - along with the roles of government and chance. Applying this model to Bulgarian non-ferrous metallurgy, which includes industries producing metals like aluminum, copper, zinc, and lead, can help to assess the competitive position of the sector in the global and European markets. The main research methods used in the development are content analysis, comparison method, intuitive and systematic approach, analysis and synthesis method.

Keywords: Porter's diamond, competitive advantage, non-ferrous metallurgy in Bulgaria.

INTRODUCTION

Both biological and business competition would follow the same pattern of gradual evolutionary change, except that business strategists have the ability to think logically and accelerate the effects of competition and the rate of change. If every business could grow infinitely, the total market would grow without limit on the finite planet Earth. This is practically impossible, as competitors are constantly being pushed out. The most flexible players survive and prosper by displacing their competitors or outgrowing their resources [1]. The term "competition" has a Latin origin (Concurrere: Con - with and Currere - run) and its literal meaning is "running towards the goal". According to one of the most prominent economists of our time, the American academic Michael Porter, competition is a rivalry between companies that use strategies of national, regional and global scales [2].

The aim of the article is to assess the competitive advantages through the Porter Diamond Theory of National Advantage. Also, it determines the interrelated set of local advantages for certain economics sectors at a given country that increase the ability of the companies to compete on the international arena. The article will examine the development and current position of the Bulgarian non-ferrous metallurgy sector.

The competitiveness of the product expresses a set of characteristics of the product and services accompanying its sale and consumption, distinguishing it from similar products by the degree of satisfaction of the needs of consumers, by the level of costs for its production (acquisition) and realization. The quality of the products and the price are the main components of

its competitiveness.

The competitiveness of the product is a complex of technical and economic characteristics of the specific product or a set of advantages that are inherent in the product in the conditions of free supply and direct competition with similar products produced by other manufacturers. This is a relative category related to the specific market and time of sale and has an evaluative-subjective nature.

THE MODEL PORTER'S DIAMOND

The modern understanding of the concept of competition is mainly associated with the "Porter's Diamond" model developed by the famous American economist Michael Porter (born 1947). There are many directions of competitive strategies of the enterprise, based on achieving competitive advantages, which M. Porter unites in three types of competitive strategies: cost leadership strategy; differentiation strategy; focus strategy. These types of competitive strategies are basic and universally applicable. Enterprises should apply only one of them in relation to a specific strategic business unit.

• Cost leadership strategy - is based on achieving a cost level lower than that of the main competitors while maintaining a product quality not lower than the industry average. This allows either to sell at prices lower than those of competitors, ... or to sell at a price similar to that of competitors.

• Differentiation strategy - the enterprise offers products with unique characteristics, with higher value and quality, with better marketing conditions compared to those of competitors. Successful differentiation allows the realization of higher profitability, at the expense of this, the market accepts a higher price for the presented goods with non-standard properties and characteristics, for additional service, for better service, etc. With this strategy, the quality of the products offered is higher than the industry average. The differentiation strategy is based on product, service, personnel and image differentiation.

• Focus strategy - implies fixation on one market element or a specific group of users without striving to cover the entire market. The purpose of the strategy is to satisfy the needs of the selected target market segment better than the competitors. A focus strategy can be based on both differentiation and cost leadership, or both, but only within the target segment. The strategy is also based on the barriers that separate the target segment from the other segments of the industry market. It is precisely such barriers, determined by the specific needs of the customers of the target segment (which the competitors carrying out large transactions in the industry market do not serve well enough), that are the main reason for choosing the strategy of differentiation. The main idea of this strategy consists in concentrating the forces in a limited target segment and in the possibility of maximum adaptation of the company's product to the needs of the users of the target segment.

In addition to the general business environment, the microeconomic business environment represented by Michael Porter's model plays a key role in stimulating innovation and increasing the competitive advantage of national firms [3]. Together, they form the national environment in which companies are born and learn how to compete [4]. According to Stone and Ranchhod, "Porter's emphasis on competition or rivalry is a departure from traditional economic thinking" [5]. The common belief among management academics that countries are somehow in competition with each other explains why the Porter's Diamond model appears in many international business textbooks. Peng defines the model as the most recent theory that explains the international competition of states: "It is the first multilevel theory that realistically links firms, industries, and nations, whereas previous theories operate in only one or two dimensions" [6].

• Company strategy, structure and competition- Company strategy refers to the long-term plan or approach that a business adopts to achieve its objectives and maintain a competitive advantage. It includes the vision, mission, goals, and the actions a company takes to position itself in the market. Strategies often evolve based on internal capabilities, market trends, and external forces like competition.

• Factor conditions - refer to the various resources or inputs a country, region, or business has available for production, which are essential in determining its competitive advantage in certain industries. The term is most commonly associated with Michael Porter's Diamond Model of national competitive advantage. Porter categorized factor conditions into various types of resources that shape a nation's or company's ability to compete in specific industries. Basic factors such as unskilled labor, raw materials, climate and

water resources are inherited and require little or no new investment to be used in the production process. Advanced factors are created and built through reinvestment and innovation into specialized factors, which Porter says form the basis of a country's sustainable competitive advantage [7].

• Demand Conditions - refer to the characteristics of domestic or local demand for goods and services within a country or market. This concept is part of Michael Porter's Diamond Model for national competitive advantage and plays a critical role in shaping how companies develop, innovate, and compete. Essentially, demand conditions influence the growth and development of industries within a country and can either drive or limit competitiveness.

• Related and Supporting Industries - another key element of Michael Porter's Diamond Model, which examines the competitive advantages of nations or regions. This component refers to the existence of supplier industries and other related sectors that support a particular industry. When these industries are competitive, they can enhance the efficiency, innovation, and overall competitiveness of the companies they support.

• Government - plays a crucial role in influencing the competitive advantage of industries within a nation. The government is not directly part of the diamond model but acts as a catalyst or enabler that can impact all four components: factor conditions, demand conditions, related and supporting industries, and firm strategy, structure, and rivalry.

• Chance - refers to unforeseen and unpredictable events that can significantly affect an industry's competitive advantage. These events are typically outside the control of companies or governments but can shape the competitive landscape by creating new opportunities or posing challenges. Chance events can include technological breakthroughs, geopolitical events, natural disasters, or significant changes in global market conditions.

RESULTS AND DISCUSSION

Non-ferrous metallurgy in Bulgaria

The production of copper in Bulgaria is carried out by "Aurubis Bulgaria" in the town of Pirdop. The Bulgarian company is part of the Aurubis group with headquarters in Hamburg, Germany. In addition to Bulgaria and Germany, "Aurubis" has factories in Belgium, Spain, Italy. In 2024, group growth is expected with the launch of a new metallurgical production in the USA, which will be entirely for the processing of secondary raw materials from the local market there. In 2020, the company invested in a project to build a PV park to produce electricity, which will cover about 2.5 % of the plant's annual needs. In 2021, "Aurubis

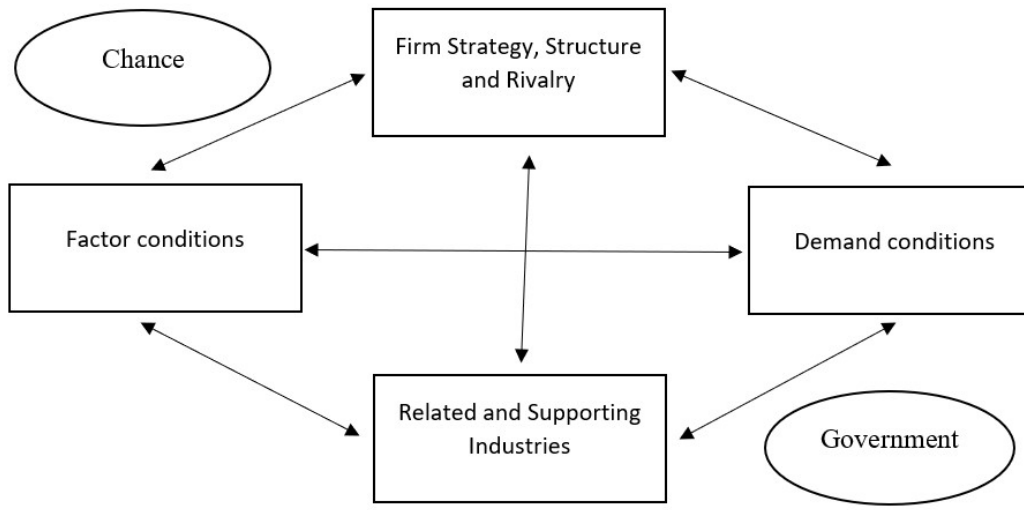

Fig. 1. Porter's Dimond model.

Table 1. Copper raw materials and finished products in Bulgaria (2016 - 2020), t [8].

Product	2016	2017	2018	2019	2020
Concentrates (purchased), t	1055636	1357144	1364490	1160132	1346197
Cu content in concentrates, %	23.69	24.00	23.94	22.95	22.17
Total Cu units, t	250080	325754	326661	266250	298452
- from import	179597	252751	256820	195323	228276
- from local	70573	73003	69841	70927	70176
Copper scrap (purchased), t	51768	52507	41844	39814	43759
Anode Copper (prod.), t	296804	375241	358676	310245	335306
Cathode Copper (prod.), t	216428	228457	224098	207196	224880

Table 2. Lead and Zinc raw materials in Bulgaria (2016 - 2020), t [8].

Product	2016	2017	2018	2019	2020
Pb in concentrates, t	61358	52149	60192	54468	57793
- from import	41670	36050	45469	37371	38873
- from local	19688	16099	14723	17097	18929
Lead scrap, t	11235	15849	11809	18356	18226
Zn in concentrates, t	63011	57307	59646	54688	60299
- from import	51596	46421	48279	40118	44610
- from local	11415	10886	11367	14570	15689
Zinc scrap, t	16802	16226	18191	19231	18907

Bulgaria" became a benchmark in terms of sustainability standards in the copper industry, receiving The Copper Mark standard.

In 2020, "Aurubis Bulgaria" processed 1.35 million tons of concentrate, which is 186 thousand tons more than the previous year and about 2 times higher compared to the first years of the 21st century. The amount of metal is estimated at 298 thousand tons of copper. In 2020, the company produced about 335 thousand tons of anode copper and 225 thousand tons of cathode copper, which is a little over 8 % growth compared to the previous year. Cathode copper produced represents 0.92 % of world production, while anode copper produced is 1.59 %. There is a trend towards lower copper content in concentrates. To maintain and increase copper metal production, more concentrates should be processed. For 2020, nearly 200000 tons more concentrate was processed, which also led to an increased production of sulfuric acid of 1.37 million tons, which is 18 % more than the previous year.

The lead and zinc production capacities of "KCM" Plovdiv are the largest in South-Eastern Europe. The enterprise is a leader in the comprehensive utilization of raw materials and extraction of accompanying non-ferrous and precious metals.

Processed lead concentrates in 2020 contain about 58 thousand tons of lead, which represents about a 6 % increase compared to the previous year. Also, the tendency for domestic lead concentrates to occupy about 30 % of the enterprise's lead concentrate portfolio is maintained. There has been an increase in the level of lead recycling, with a significant 62 % increase from 2016 to 2020. Processed zinc concentrates contain 60 thousand tons of zinc, which represents a 10 % increase compared to the previous year. Local and imported zinc concentrates are increasing in parallel, and for the last 2 years, local raw materials represent 26 % of the company's zinc concentrate portfolio. Zinc recycling is also increasing for the period 2016 - 2020 by just over 12 %.

"Sofia Med" is the largest Bulgarian enterprise

specializing in the production of rolled and pressed products from copper and copper alloys - sheets, strips, plates, circles, rails, bars and others. The enterprise is part of the Greek group "ElvalHalkor". Investments are made in it with the aim of increasing production, and for 2020 BGN 21.7 million have been invested to increase the capacity for cold rolling and purchase two furnaces for heating the production. In 2020, the enterprise processes about 27000 tons of copper scrap, which amounts to 30 % of the necessary raw materials. The figure below shows the annual production of rolled products, which for the period 2016 - 2020 has increased significantly by about 44 %.

"Alcomet" is the largest company in Bulgaria, specializing in the production of rolled and pressed aluminium products. The company offers various types of foil, finstock, sheets, strips and profiles. It also manufactures parts for the automotive industry. In 2020, nearly 74000 tons of rolled aluminium were produced at the enterprise, which is 12 % more than in 2016 and shows the trend towards increasing production. Like the rest of the company, significant investments are being made in Alcomet's enterprise, amounting to BGN 18.6 million in 2020, aimed at installing new capacities for the absorption of products with a higher added value. The ratio of rolled and pressed aluminum products produced is 2 to 1 for the last 2 years.

The main conclusions that can be drawn in the context of the development of the production of non-ferrous metals and their products are the following:

- The extraction of non-ferrous metals on the territory of Bulgaria is carried out by two metallurgical enterprises: "Aurubis Bulgaria" in Pirdop and "KCM" in Plovdiv, which are the only ones that successfully went through privatization in the transition years.
- Increasing the capacities of the main production enterprises in the last 20 years. Implementation of new technologies and know-how aimed at increasing production and reducing the harmful ecological impact on the environment.
- Increase in the volume of lead and zinc recycling over the last 5 years. The level of recycled lead relative to total lead production is about 33 %.
- Improvement of the metalworking industry during the period 2016 - 2020 in the order of 24 %. Directing part of the production to production with a higher added value.

Table 3. Distribution of assets of non-ferrous sector in Bulgaria, %.

Type of assets	Distribution
Non-current assets	39.8 %
Current assets	60.2 %
Total assets	100.0 %

Financial status and indicators

The highest relative share of the total amount of short-term assets is occupied by inventories. Just over 63 % of the sector's working capital is involved in raw materials, finished goods and work in progress. The set of particularities of the sector requires more flexible management of material stocks through optimization of supply. On second place, with a high relative share of 25.81 % of the total amount of short-term assets, are short-term receivables. Together with material stocks, they form about 89 % of the entire volume of short-term assets. The share of short-term financial assets is significantly low, which is 1.48 %. Financial investments remain unknown in modern production and an advanced economy, although they offer a profitable investment of temporarily free cash/. Cash is only 9.29 % of total current assets. According to the indicator for securing short-term liabilities with cash, for every BGN 100 of short-term liabilities, about BGN 4 of available money falls, which is totally insufficient.

Based on the consolidated financial statement of "Aurubis", a positive interrelationship of the proportionality between the volume of fixed assets and equity is observed. In 2021, the volume of fixed assets is 77 % of the volume of equity. This ensures good financial stability of the enterprise, which contributes to the security of working capital. The opposite trend was observed in KCM Plovdiv during the same year. The volume of fixed assets is 130 % of that of the equity capital, and thus the working capital has to be financed by external financing. For Aurubis, the ratio between long-term and short-term assets is optimal. The value of short-term assets exceeds 2.55 times that of long-term assets. In the case of KCM, this ratio is violated, with short-term ones being 30% of the value of long-term ones. In this case, there is a shortage of fixed capital, through which fixed assets are mainly financed.

The capital structure in the sector is improving, and

currently the value of fixed assets does not exceed the equity capital of non-ferrous metallurgy enterprises, in contrast to the years at the beginning of the 20th century, when the relationship was the opposite. Also, enterprises have gradually come out of the financial difficulties they experienced in the production process. The amount of equity capital of the sector is not optimal. In the case of individual enterprises, it is observed that Aurubis owns equity, which is 36 % of the total capital resource. This means that the company primarily relies on the capital raised. In the case of KCM Plovdiv, the equity represents 57 % of the total capital resource, which ensures the financial stability of the company. In the structure of the attracted capital, there is a significant difference between the volume of short-term and long-term liabilities. Short-term assets account for 89 % of the total volume of liabilities for the sector. This, in turn, reinforces the thesis of high financial dependence in the non-ferrous metallurgy sector. The short-term indebtedness of the sector is far from the optimal 2:1 ratio of current assets to current liabilities. However, it is observed in the sector that short-term assets are slightly more than 15% more than short-term liabilities, which is a positive signal. It is observed that the capital structure in the sector is not optimal. Equity occupies a little over 41 % of the total capital resource against a normal 60-65 %. A large share of the profit of the enterprises goes to repayment of interest on received funds.

Although the share of equity capital relative to the total volume of capital for the sector has grown since the beginning of the 21st century, it is still insufficient. In order to ensure the normal course of production processes, cash is needed, which is provided by the owners of the company or through external funds attracted by third parties for a certain period of time (shorter or longer). In order for production processes to run efficiently, it is necessary to find the golden mean between own and borrowed capital, which in turn will lead to an accelerated increase in capital and, accordingly, in the market price of the enterprise. The financial performance of the enterprise has an extremely important role, since its growth leads to an increase in equity.

At the beginning of the 21st century, the share of equity capital in relation to the total amount of capital in the metallurgy sector was around 34 - 35 %, and in 2020 and 2021 this share increased to just over 41 %, which is a positive trend for the sector. Because any profitable operation of an enterprise requires enough equity capital to finance investments in long-term and short-term assets. There has also been a positive increase in the return on equity of enterprises, at the beginning of the 20th century it was around 16 % compared to 25 % in 2020 and 2021. Also, the amount of fixed assets is less than the value of equity. The main factor is the effective management of working capital for the normal functioning of business entities. According to the data for 2020 and 2021, the working capital is BGN 450 thousand, which is a positive signal for the state of the sector. The total liquidity ratio is 1.16 and is at a satisfactory level. Enterprises from the sector still have work to do in terms of financial autonomy. Despite the positive trend of reducing the attracted capital, it should be further reduced to reach more optimal levels of 30 - 35 %, at 58 % in 2020 and 2021.

The positive balance of imports and exports in 2020 shows that the export of non-ferrous metals continues to exceed more than twice the import of the same. Key factors include good competitiveness on European and global markets, existing non-ferrous mining and processing capacity that exceeds domestic needs, and production of a wide range of high-quality products. Population, labour market, wages, GDP and productivity have a significant impact:

• A 4.2 % decline in GDP in 2020 due to the spread of the pandemic. The period before that was characterized by sustainable growth in the order of 3.0 - 3.5 % on an annual basis;

• The demographic crisis continues to deepen, with the population decreasing by 34.6 thousand people in 2020, with a drop of 46.5 thousand people in 2019 and 50 thousand in 2018; The shortage of qualified labor in the industry remains;

• The non-ferrous metallurgy sector is characterized by a high average monthly salary of BGN 2,382 and is nearly twice as high as the average for the processing industry;

• In 2020, employers have increased their costs due to the epidemic situation and problems related to continuous processes with a specific work schedule, the need for additional protective equipment, increased morbidity, and absenteeism;

• The value added per employee in the metallurgy sector is more than twice as high as the average in the

Strengths		Opportunities
- Increase the export of non-ferrous metals - Improvement of market positions - High investments in the sector - Investing in research & development - Production modernization - Introduction of new technologies		- Expansion of production capacities for recycling - Increasing the share of eco-friendly production - Improving the production quality - Implementation of highly productive and eco technologies
	SWOT	
Weaknesses		Threats
- High raw material and energy intensity - Major environmental pollutant - Dependence on the state of transport, the technical and social structure - Low degree of freedom in pricing - Strong dependance on the global economic situation		- Strong dependance between the national, regional, and global state - Depletion of raw material sources in the country, which necessitates the import of raw materials - Depletion and limitation of world raw material reserves

Fig. 2. SWOT analysis.

manufacturing industry, and it is four times higher for the non-ferrous alone.

• The share of industry in Bulgaria's GDP for 2020 is 18.8 % and is above the European average (15 - 16 %).

Swot analysis

In the period from the beginning of the transition to the present day, the volume of foreign investments in the metallurgical enterprises located in Bulgaria has increased significantly. The sector is enjoying a positive development thanks to investments in technology, engineering and ecology. This contributes to better competitive advantages of these companies in global markets. In the table below, it is presented the SWOT analysis of the non-ferrous metallurgy sector in Bulgaria.

CONCLUSIONS

Metallurgy has a structure-determining influence in the national economy of the state. The sector occupies a relatively low relative share in the country's economy, but its development significantly affects all other economic sectors. Non-ferrous metallurgy, as an economic sector, proves its ability and possibility to work in the free market during the years of transition. The level of production is preserved and even increased, which in turn leads to an increase in labour productivity, financial stabilization and improves market positions. The available equipment and technologies allow the production of various metals and metal products in demand on international markets. Modernization and development of the metalworking industry in the period 2016 - 2020 of 24 %. Directing part of the production to a higher added value one. Furthermore, there is a positive increase in the profitability of enterprises in relation to equity. Overall, the situation of the non-ferrous metallurgy continues to sustainably improve.

REFERENCES

1. B. Henderson, The Origin of Strategy, Harvard Business Review, 1989.
2. F. Bosch, A. Man, Perspectives on Strategy: Contributions of Michael E. Porter, Kluwer Academic Publishers, 1997, p. 20-30.
3. I. Slavova, Y. Bankova, H Ivanov, Clusters and Cluster Initiatives in Bulgaria: Development and Challenges, University of National and World Economy, Economic and Social Alternatives, 2018.
4. M. Porter, The Competitive Advantage of Nations, ISBN 978-0684841472, Free Press, 1998.
5. H. Stone, A. Ranchhod, Competitive advantage of a nation in the global arena: a quantitative advancement to Porter's diamond applied to the UK,

USA and BRIC nations, Strategic Change, 2006, 15, p. 283-294.
6. M. Peng, Global Business, South-Western Cengage Learning, 2009.
7. A. Smit, The Competitive Advantage of Nations: Is Porter's Diamond Framework A New Theory That Explains the International Competitiveness Of Countries, Southern African Business Review, 2010.
8. Bulgarian Association of the Metallurgical Industry, Metallurgy in Bulgaria 2020, 2021, https://bami.bg/media/docs/godishnik_2016_eng.pdf, Available 10.09.2024.