ENHANCING THE COMPETITIVENESS OF BIO-SECTOR ENTERPRISES FOR STRONGER BIO-ECONOMY

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Abstract: We live in a world of scarce resources and global challenges, such as climate change, ecosystem degradation, and an increasing population. All of this necessitates the shift to a new way of economic growth that is compatible with the protection of the environment and the sustainable use of scarce natural resources, while guaranteeing a higher standard of living reducing poverty. These conditions are forcing us to seek new production and consumption opportunities that are in line with the ecological boundaries of our planet. Addressing these challenges requires a focus on research and innovation to create new biomass products or new services needed to develop the bioeconomy, helping to reduce climate change, waste, create new jobs and build a sustainable bioeconomy. According to the OECD, by 2055 the bioeconomy will be the basic principle for the development of the European economy. This means that the focus will be on the production of renewable bio-resources in agriculture, forestry and aquaculture, and biomass will become a major source of industrial raw materials. At the same time, the environment in which the companies from the food industry in Bulgaria operate after the country's accession to the European Union puts them in highly competitive conditions, under which the emphasis is on the quality and safety of the products produced. Both the theory of competitiveness and the topic of products made from bio-raw materials have been widely discussed in recent years and research in this field is increasing, but the Bulgarian literature lacks in-depth information on the link between competitiveness systems and bio-products production.

The purpose of this report is to present the results of a research study aimed at proposing, on the basis of summaries and analysis of the theory and methodology in the field of competitiveness, a model revealing opportunities for enhancing the competitive advantages of the enterprises from the bio-sector in Bulgaria. The subject of the study are enterprises from different sub-sectors of the bio-industry in Bulgaria. The object of the study is the different approaches, models and methods of evaluation and analysis, outlining the possibilities for increasing the competitiveness of bio-enterprises. Various research methods were used: induction and deduction, analysis and synthesis, content analysis, statistical data analysis, econometric analysis of time series, general equilibrium modeling, questionnaires, interviews, case studies and more.

As a result of the study of the industrial structure in which the bio-sector enterprises operate, the conditions and the level of competitiveness of the different sub-sectors of the bioeconomy in Bulgaria are summarized. The results provide an opportunity to develop strategic solutions that increase their competitive advantage and make them more sustainable in the bio-economic environment.

Keywords: bioeconomy, bio-enterprises, bio-resources, competitiveness

1. INTRODUCTION

The bioeconomy encompasses[185] the production of renewable biological resources and the conversion of these resources and waste streams into value-added products such as food, feed, bio-based products and bio-energy. The bioeconomy includes[186] the agriculture, forestry, fisheries, food and pulp and paper sectors, as well as parts of the chemical, biotechnology and energy industries. Biologically based products are products that are wholly or partially derived from materials of biological origin, with the exception of materials embedded in geological forms and / or fossils. The bioeconomy relies on life sciences, agronomy, ecology, food sciences and social sciences, biotechnology, nanotechnology, information and communication technologies (ICT) and engineering[187].

A comparative analysis of the definition of the bioeconomy in the EU, OECD and documents of EU Member States has made it possible to determine that the bioeconomy is part of an economy related to the following: sustainable production of bio-resources and their processing into value-added products; land and water (plants, animals and

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micro-organisms) and bio-based products; types of economic activities (in other words, economic sectors) related to the production, processing or recycling and use of such as plants, animals, micro-organisms and their products; the use of modern technologies such as biotechnology, nanotechnology, information and communication technologies, in addition to traditional technologies. Thus, the definition of bioeconomy according to the Communication from the European Commission Innovation for Sustainable Growth: A Bioeconomy for Europe reflects the nature and content of the bioeconomy, covering all the specific material elements of the bioeconomy. According to this Communication, "… the bioeconomy encompasses the production of renewable biological resources and the conversion of these resources and waste streams into value added products such as food, feed, bio-based products and bio-energy". This description of the bioeconomy is clear, easy to understand and suitable for defining the bioeconomy in the Bulgarian legislation. It should be added that this definition of bioeconomy has been frequently cited in various EU bioeconomic surveys recently. The aim of the bioeconomy is to build an innovative low-emission economy that integrates the requirements for sustainable agriculture while protecting biodiversity and the environment.

According to data from the European Commission's Research Center, bio-economy turnover in 2018 across the EU is over € 2.3 trillion. The workforce employed in the various sectors (mainly the agricultural and food sectors) represents 8.2% of the EU-wide workforce28, which is over 18 million people. According to industry estimates, more than one million new jobs can be created in the bio-industry by 2030. These indicators place the bioeconomy among the key elements for the successful functioning of the EU economy. A more sustainable operation of businesses in it will contribute to building: a carbon-neutral future (in line with the Paris Agreement's climate targets) and reducing greenhouse gas emissions in the European energy sector. Bioenergy (which is the largest renewable energy source in the EU) will remain a major component of the energy mix and will contribute to meeting the EU's renewable energy targets of 20% in 2020 and at least 32% in 2020. 2030; modernization and consolidation of the EU industrial base will be achieved through the creation of new value chains, as well as greener and more cost-effective industrial processes. At the same time, the bioeconomy is a renewable segment of the circular economy. It can help turn bio-waste and residues into valuable resources and create innovation and incentives to help producers and consumers reduce food waste by 50% by 2030.

Increasing the competitiveness of enterprises in the bioeconomic sectors is of strategic importance for their sustainable development.Competition is a driving force and an incentive to increase the efficiency of business operations. It is an integral part of the market economy and should be considered in relation to the market as a whole system[188] . Since competition is a competition between different business entities, it allows for the most efficient use of resources and the most successful organization of business to achieve the ultimate goal of making more profits[189]. Competition can be defined as a driving force for the development of society. It provokes the use of the best of abilities and knowledge, leads to increased human wealth and diversity, leads to rational behavior on the part of sellers and buyers, and rational use of resources[190]. According to Joseph Schumpeter, in the economic system, the new combinations make their way, defeating the old ones, and for him this process is the basis of competition. Enhancing the ability of enterprises to meet standards more stringently is likely to create new forms of competitive advantage[191]. In this regard, research has been carried out on some sectors - Spring and Isaac emphasize the fundamental importance of food safety to the competitiveness of the meat industry in Australia, Canada, the UK and the United States. Issues related to increasing business competitiveness are particularly relevant as they affect in particular the bio-industry and, more generally, they are also linked to national competitiveness [192].

Under increasingly sophisticated market relationships, the success of the food industry is driven by their flexibility and adaptability to the demands of their environment, as well as the prudent management of intra-company processes focused on the quality and safety of production.

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1.1. Form the model of perfect and imperfect competition

The neo-classical theory of perfect competition is based on unrestricted competition between business entities. The main moments in it were developed by Adam Smith, and A. Marshall, L. Walras, E. Djevins and Pareto are involved in the development of the model. The main points in A. Smit's theory of perfect competition are:

- Defines the notion of competition as rivalry, rising prices when supply is reduced and prices fall in surplus supply.
- Defines the main principle of competition - "The principle of the invisible hand". Competition forces market players to follow the instructions of the "invisible hand" and is a mechanism to automatically achieve market equilibrium.
- Develops the theoretical foundations of a flexible competition mechanism that balances the industry's profit rate, leading to an optimal allocation of resources across the various sectors of the economy[193].
- Defines the basic conditions for effective competition, including the availability of a large number of sellers and buyers, the mobility of the resources used, the availability and availability of information on the level of demand, supply and prices, which makes it possible to make optimal choices[194].
- Defines competition as a means of solving contradictions between private and public interests.

Perfect competition - characterized by a large number of players (sellers and buyers) on the market. Each of them has enough full market information and none of them can control market demand, delivery of goods and their price. Perfect competition is growing into its antipode - the monopoly, that is, in imperfect competition. It appears in a market where individual producers (sellers) can have some impact on the price.

In the monopoly theoretical model there is only one producer or consumer who has no competitors on the market, there are no substitutable goods or services[195]. There are different circumstances in which a firm may become a monopolist. In this sense, it is a closed, natural or open monopoly.

- *Closed monopoly* - is typical for cases where the company is protected by competition by means of legal restrictions (by the Copyright Agency).
- *Natural monopoly* - exists when there is a company producing a unique product on the market and there are some limitations on the factors of production (unique natural resources).
- *Open monopoly* - for a while, a company is the only supplier of a particular product without any specific protection from competition, as in the closed and natural monopoly, but in the future a competitor may appear.

When examining market conditions, the authors of the theory of *imperfect competition* focus their attention on the situations of *polypole, oligopoly and monopoly*

- ✓ *Polypol* is a market with many participants, but they are mostly small companies;
- ✓ The *oligopoly* is a market with a small number of participants, but medium-sized companies;
- ✓ The *monopoly* is a market with only one bidder on the demand or supply side, but it is a big company.

In order to regulate competition, Bulgaria adopt and enforce anti-monopoly legislation.

There are quantitative methods defining market conditions for determining the nature of competition. Widespread indicators are two: the concentration ratio of leading (usually four) firms and a Herfindal-Hirschman index.

Concentration ratio of the four largest companies - represents the sum of the relative shares of the sales value of the four largest companies. Determined by the formula:

$$CR4 = MS1 + MS2 + MS3 + MS4 \qquad (1)$$

where:

CR4 is the concentration factor (concentration ratio);

MS1, 2, 3, 4 – market share (as a percentage) of the four largest companies.

The index may range from zero in pure competition to 100% in monopoly. An indicator value above 40% is indicative of oligopolistic competition, and below 40% for monopolistic competition.

Herfindahl-Hirschmann Index - represents the sum of squares of market shares of major competitors. Determined by the formula:

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$$HHI = \sum_{i=1}^{N} (MS)_i^2 \quad (2)$$

where:

HHI is the Herfindal-Hirschman index; MS - market share in percent; N - the number of competitors.

The higher the index, the more monopolized the relevant market and:

HHI ≤ 1000 means a competitive market;
1000 ≤ HHI ≤ 1500 - Slightly monopolized market;
1500 ≤ HHI ≤ 2500 - moderately monopolized market; HHI ≥ 2500 - high concentration of monopoly power; HHI = 10,000 - full monopoly of 1 company.

1.2. Analysis of the bio-company's competitiveness and discussion

The research and analysis of the competitiveness of a company is carried out at three levels - national (macro level), sectoral and company level. It can take place both in the order and in the opposite direction: company, industry, national level. The relationship of the analysis levels with the analysis tools is presented in Fig. 1.

At national level, the Porter Diamond tool is most commonly used to analyze competitiveness. The four main tips in the "diamond" are: *Factors of production; Demand conditions; Connected and supporting industries. Company strategy, Structure and competition.*

At company level, the competitive advantage can be determined by the following methods: **Competitive triangle** - is a comparison with the leading competitor. It is often used also the abbreviation three K (client, company, competitor). The competitive triangle reflects the fact that the consumer perceives the value offered by a particular company and its main competitor.

Value chain. It uses the system approach to form the market advantage of the company. It divides company activities into two types: primary and secondary.

At the industry level, the *"Porter's Five Force Model"* is the most widespread[196] . Its main **Benchmarking method - drawing up a profile of competence**. The method allows for ongoing monitoring of the main rivalries and comparison with customer requirements, not the establishment of the results after the occurrence of the unfavorable events or at the end of a certain period [197]. In the current conditions of increasing competition between rivals, the idea of the dynamic nature of competitive advantage and hyper-competition is becoming more and more popular. These models emphasize the speed and aggressiveness of the action taken and the countermeasures in the particular market, resulting in competitive advantages quickly becoming eroded.

Hyper-competition. The model is based on the following prerequisites. Any competitive advantage may be copied or undermined by other market participants. Once overcome, it becomes a burden. Blindly following the idea of maintaining the market advantage can be a fatal delusion because the pursuit of perfecting the advantage diverts attention from the formation of a new competitive advantage. Overtaking of the immediate competitors is not once established forever. It represents a number of small steps, each of which allows to undermine, destroy the advantage of the opponent or build the next competitive advantage before eroding the present. In this direction, the following strategies can be implemented:

The strategy of undermining the market advantage includes two elements: *consumer satisfaction* and *strategic prediction (prediction*). They help to explore in more detail the requirements of current users or to open new customers whose needs are not satisfied. This strategy can also be used by the market leader, and in this case, it will be possible for him to preserve his position .

The tactic of erosion of the market advantage includes three types of possible actions: *changing the game's rules* - the conditions of competition by opening new ways of servicing consumers; *disclosure of strategic intentions* - to drive action and track competitors' responses; *simultaneous and consistent attacks* on rivals to confuse and block their efforts to maintain the market advantage. These actions shape the direction or nature of the response of competitors.

The possibilities of undermining the competitor's market advantage are two: *speed and surprise*. Positioning the product and brand with the ability to reposition it as quickly and in a way that will surprise the competition.

1.3. Exploration: Determining the nature of competition in Bulgarian bio-industry

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The survey of was conducted between September of 2018 and February of 2019 among companies of various food' industry subsectors and sizes. The survey is based on open and closed questionnaire distributed by email. A questionnaire was used to collect data from a sample of 198 entreprises which were selected through stratified random sampling method from all subsectors of Bulgarian bio-industry. Respondents are representatives of all major subsectors of the bio industry in Bulgaria and their relative shares are shown in Fig. 1.

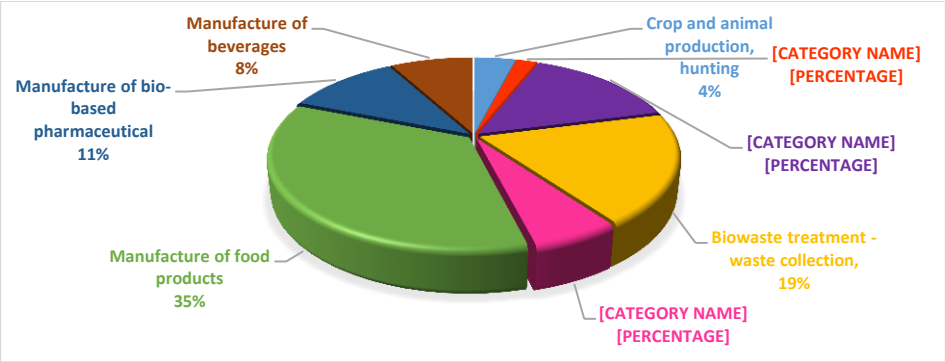

Fig.1 *Share of respondents from bio-sector in Bulgaria*

It appears that the largest share is the respondents representing the subsector - manufacture of food products - 35%; followed by representatives of biowaste treatment sector - 19%, the manufacture of gas- 15%, followed by manufacture of bio-based pharmaceuticals - 11%, manufacture of beverages- 8%; the fishing and aquaculture - 6%, crop and animal production, hunting and related service activities are 4%, and with the smallest share being the respondents from forestry and logging - 2%.

Table 1. *Determining the nature of competition in Bulgarian bio- industry*

The scope of economic activities in the bioeconomy	**Widespread indicators**		**The nature of competition**
	the concentration ratio of leading firms	***Herfindal-Hirschman index***	
1. Crop and animal production, hunting and related service activities	49 %	HHI < 1 000	Competitive market
2. Forestry and logging	69 %	1 000 < HHI< 1 500	Slightly monopolized market
3. Manufacture of gas	83 %	1500 < HHI < 2 500	Moderately monopolized market
4. Biowaste treatment - waste collection, treatment and disposal activities; materials recovery	81%	1 500< HHI <2 500	Moderately monopolized market
5. Fishing and aquaculture	95%	HHI =10 000	Full monopoly
6. Manufacture of food products	43 %	HHI < 1 000	Competitive market
7. Manufacture of bio-based pharmaceuticals	61%	HHI > 2 500	High concentration of monopoly power
8. Manufacture of beverages	56%	HHI < 1 000	Competitive market

We applied the quantitative method to measure market conditions for determining the nature of competition in Bulgarian bio-industry (see Table 1).

The analysis of the survey results shows that the companies from Fishing and aquaculture subsector in Bulgaria are operating under conditions of monopolistic competition. Forestry and logging firms are operating under a slightly monopolized market, with the concentration ratio of leading firms CP >40%, which is indicative of working in oligopolistic competition. Manufacturer of bio-food products, manufacturer of beverages as well as those from the

subsector of crop and animal production, hunting and related service activities, operate under conditions of monopolistic competition. Manufacturers of bio-gas and companies for biowaste treatment work in a moderately monopolized market. The companies from the subsector of manufacture of bio-based pharmaceuticals products works in the condition of high concentration of monopoly power.

CONCLUSION

The most important subsectors of bioeconomy (manufacture of food products, manufacture of gas and beverage production) are identified as well as those with the best prospects from an economic point of view (canned fruits and vegetables, vegetable and animal oil, dairy products). An analysis of the industrial structure and the market conditions in which they work is carried out. As a result of the survey, it has been established that the bio-industry in Bulgaria is experiencing difficulties in marketing and innovation activity, offering products that meet specific consumer needs, using modern methods of analysis, applying management practices, building on voluntary standards. The conclusion is that the main subsectors of the food industry in Bulgaria are operating in the conditions of monopolistic competition, which requires the adoption of concrete strategic decisions for affirming their competitive advantages and expanding the market positions.

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