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## **FOREST INDUSTRY IN REPUBLIC OF BULGARIA: STATE AND PROSPECTS**

### **Abstract:**

The paper attempts to characterize the performance and problems in Forest Industry in Republic of Bulgaria. It contains general characteristic like technological and economic characteristics of the Forest Industry in Bulgaria, technological operations and wood processes, trends of the furniture in EU as a main final product in the Forest Industry. It presents the largest enterprises and the biggest foreign suppliers also and countries for export and import. The paper also presents the performance of the Forest industry enterprises in Bulgaria in strategical management areas like quality, ICT, financing, marketing, internet, internationalization and innovations.

The methods applied include statistical analyses of production, value added and employee, expert assessments as well as generalization survey's results from a focus group of managers of Forest industry SMEs, provided in 2016.

Some recommendations are drawn in areas of strategic management (technologies and information, innovation cooperation) and in areas of production and operations management.

### **Keywords:**

Forest Industry; Wood processes; Woodworking; Furniture manufacturing; Strategic management; Production management; Innovation cooperation.

**JEL Classification:** L68, L73, M11

## 1. Introduction

The Forest Industry in Bulgaria has a dynamic development and an increase of the number of enterprises and the number of employees by 2008. After the financial crisis, this trend was interrupted until 2013 when the sector started to revive. The industry has a tradition of furniture production, raw material availability and export potential. In addition, the strengthening of competition, including by Asian manufacturers, puts the production of furniture and wood products in Bulgaria in check and puts into focus its competitive advantages and the problems it faces.

## 2. General characteristics of Forest Industry

The Forest Industry includes Woodworking and Furniture manufacturing. Over 99% of the enterprises are small and medium sized. According to the Bulgarian Chamber of Woodworking and Furniture Industry data, for the period 2008-2015, the number of enterprises in both subsectors of 4226 reached to 4074 and an employment - 47 663 in 2008 and 36 682 in 2015. Woodworking and furniture industries produces about 3,5% of the total national GDP, slightly more than 10% of the industrial GDP and more than 20% of the GDP of the manufacturing industry. According to the statistical data, more than 99% of the companies from the furniture sector in Bulgaria are small and medium sized enterprises. (Eurostat, BCWFI, 2018)

The largest enterprises in the Forest Industry in Bulgaria are: „Irelly“ - Pazardjik (672 employees); „Velde Bulgaria“ - Troyan (600 employees); „Kronospan Bulgaria“ - Burgas (410 employees); „Kastamonu“ - Kazanlak (220 employee); „Mebel Still“ – Targovishte (550 employee); „Sredna Gora“ – Stara Zagora (500 employees); „Paralell“ - Sevlievo (285 employees).

The main foreign suppliers of materials brands in Bulgaria are: JAF - Bulgaria Ltd. (EGGER); PRODOZ Ltd. (Haefele); Rally M (BLUM); .Solaris-M Ltd.; SALEX Ltd.

Technical and economic characteristics of the Forest Industry are: (Grigorov, 2008)

- the main raw material used in woodworking is wood;
- from wood is producing wood panels, plywood and others products;
- low transportability of raw materials and production based wood;

- high level of wood waste accompanying the different phases of the treatment of wood;
- when multiple participation of wood at different stages of technological processes for machining with the amount of added labor in the production process, increasing its economic value.

**Table 1 – Production and value-added in Forest Industry in Bulgaria, 2015**

2015	Manufacture of wood and of products of wood	Manufacture of furniture
<b>Production (EUR million)</b>	483,7	965,2
Relative share,% EU 28	<b>11,7 %</b>	<b>12,1 %</b>
<b>Value added (EUR million)</b>	106,6	262,6
Relative share,% Bulgaria	<b>0,29 %</b>	<b>0,71 %</b>
<b>GDP</b>	37125,5 (EUR million)	
	<b>3,65%</b>	

Source: Eurostat, 2018

The Forest Industry is a part of sector C "Manufacturing" and according to the *Classification of Economic Activities – 2008*, the economic activities included in the field of Forest industry are as follows: (www.nsi.bg, NACE rev. 2, 2018)

- *Division 16 Manufacture of wood and products of timber and cork, except furniture;*
- *Division 17 Manufacture of paper and paper products;*
- *Division 31 Furniture manufacturing.*

*Division 16 „Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials“ includes:*

16.10 Sawmilling and planning of wood

16.21 Manufacture of veneer sheets and wood-based panels

16.22 Manufacture of assembled parquet floors

16.23 Manufacture of other builders' carpentry and joinery

16.24 Manufacture of wooden containers

16.29 Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials

*Division 31 Manufacture of Furniture includes:*

31.01 Manufacture of office and shop furniture

31.02 Manufacture of kitchen furniture

31.03 Manufacture of mattresses

31.09 Manufacture of other furniture

*Division 17 Manufacture of paper and paper products includes:*

17.11 Manufacture of pulp

17.12 Manufacture of paper and paperboard

17.21 Manufacture of corrugated paper and paperboard and of containers of paper and paperboard

17.22 Manufacture of household and sanitary goods and of toilet requisites

17.23 Manufacture of paper stationery

17.24 Manufacture of wallpaper

17.29 Manufacture of other articles of paper and paperboard

The main countries for export and import in Forest Industry in Bulgaria are: (www.timberchamber.bg, 2018)

- *Manufacture of wood and products of wood and cork, except furniture*

Export: Greece, Turkey, Serbia, Macedonia, France

Import: Romania; Turkey; Austria; Germany; France

- *Furniture manufacturing*

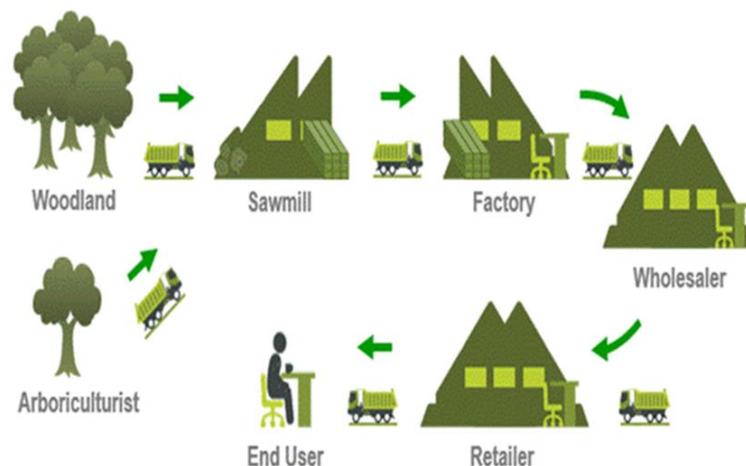
Export: Germany; Italy; France; Czech Republic; Great Britain

Import: Germany; France; Italy; Poland; Spain

### 3. Production management in Forest Industry in Bulgaria

The typical Supply Chain in Forestry includes next main steps: *Logging – Sawmill – Factory – Wholesaler - Retailer – End user*. Manufacture of wood and of products of wood includes activities for the processing of wood raw material by logging, manufacture of products of wood, cork, veneer and plywood, parquet floors, woodwork and wood products for construction, wooden containers, paper and paperboard, etc. The production of woodworking enterprises is a base material in the furniture factory and other wood-based manufacturings.

Figure 1 – Supply Chain in Forestry



Source: <https://www.forestry.gov.uk>

Wood has a number of features. The most important of them are: (Grigorov, 2008)

- The wood is an organic material of plant origin and is reproduced in nature with or without human intervention. For most tree species reproduction process lasts from 80 to 120 years, and for fast growing species from 15 to 40 years.
- The wood has an universal use-properties. Thanks to them, it is used in many sectors of the national economy – in industry, in agriculture, in construction, in the manufacture of musical instruments, etc.
- The wood could be defined as scarce raw material, due to the wide use and long periods of reproduction.
- The wood has a large heterogeneity in the species, size (length, diameter, volume), shape (curvature), and particularly in physical and mechanical properties that are different even in a separate carcass in the longitudinal, transverse and radial direction. Depending on these differences is determined the technology and organization of processing and its storage mode for the machines, quantity and use.

The securing of raw materials is very important for the enterprises. It determines the achievement their economic goals and between both sectors Forestry and Forest Industry. The timber is simultaneously exercised product of Forestry and the main raw material in the Forest Industry.

***Technological operations in Forest Industry includes:***

- *Cutting* - production of boards and beams, production of sleepers and production of details;



- *Development and adhesion* - production of veneer, production of plywood, production of matches;



- *Crushing and pressing* - production of wood slabs, production of chips, wood flour and more.



- *Combined operations* - production of furniture, production of packaging, production of musical instruments, other productions.



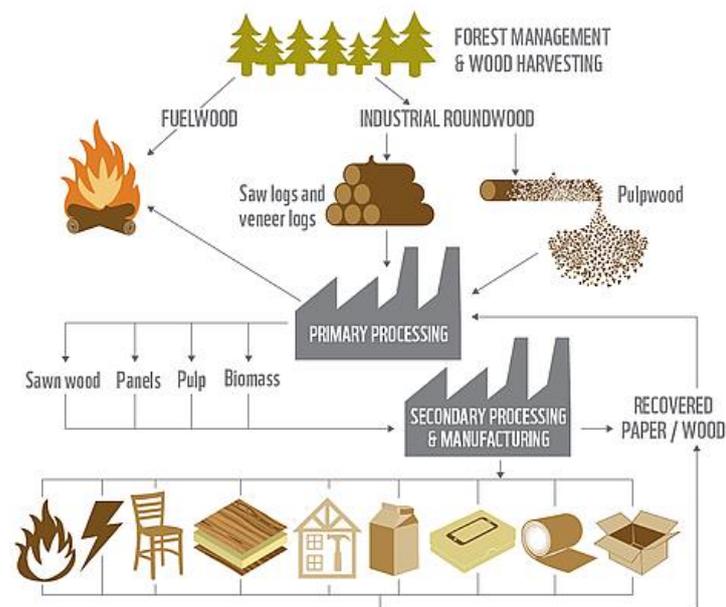
On the one hand, the production and sale of wood determine the financial results of companies whose business is the manufacture of wood. On the other hand, wood is the raw material of quality and quantity on which depends the economic performance of enterprises, who transform it. For the businesses influenced by many other factors - the price of raw materials, seasonality and timing of deliveries, average transportation distances, etc.

The raw material price is the main factor for the competitiveness of the Forest Industry enterprises. This cost typically varies between 40 and 65% of the total cost, depending on

the category and quality of the wood and the cost of the other components of the manufacturing process, for example chemicals, energy and labor.

In Forestry there is an underused waste and transport problems. The amount of waste in this production is around 25-40% in plywood, while the veneer - over 60%. Some of enterprises organized additional manufacturing for the recovery of waste and used the wood like a fuel. The modern market offers appliances for domestic heating, wood briquettes, wood pellets and wood chips that are proven and proven technology. They are also available cleansing technologies (filtration) of the flue gases, which are mainly used in large power plants of wood chips. This improves the significant use of solid biofuels as a source of heating.

**Figure 2 – Wood processes**



Source: <http://wwf.org>

The Forest sector produces a variety of end products and has a different target groups of consumers. The main end product for the sector is the furniture. But wood products are also used for construction, technological fuel and heating (wood pellets, wood briquettes, wood chips, firewood), wood packaging (pallets, crates, boxes), as well as paper and paperboard. Production in the sector includes many other varied products such as

wooden toys, sports equipment, writing boards, coffins, household wood products and products, etc. But the share of these products is significantly lower.

The products manufactured in the furniture enterprises are extremely diverse as the final product (styles and models, colors and sizes) and implies diversity of forms of organization of production, depending on the type of production - small businesses with a single type of production and tailor made work are individual form organization, with increasing specialization of production operations, equipment and production volumes - group form of organization. It reflects of design development, engineering and technology, and training of staff.

Furniture enterprises, depending on the objects, producing furniture for public spaces (hotel furniture, office furniture, school furniture, etc.) and home furnishings (kitchens, bedrooms, dining rooms and living rooms) in the form of sofas, tables, chairs and furniture parts. This diversity suggests variability and flexibility of complete solutions and new products often require new technologies, techniques and working methods.

Some of the main trends in the furniture industry in the EU are: (CBI Market survey, 2009)

- Using modern materials and combinations of materials, increased multifunctional requirements and occurrence of spaces with special applications;
- Using of machinery and equipment, corresponding to the type of production;  
Using Integrated ICT and e-business;
- Using professional designers (growing importance of design, eco-design and eco-manufacturing);
- Supply Chain Management efficiency;
- Cooperation between producers and experts and outsourcing of production and some functional activities.

The cooperation is not fully utilized in Forest Industry in Bulgaria. There are a few unsuccessful attempts and actually one cluster – Bugarian Furniture Cluster.

#### **4. Strategic management in Forest Industry in Bulgaria**

The strategic management of the enterprises is presented in areas of Quality management, ICT, Financing, Marketing, Internet, Internationalization, Innovations. According to Bulgarian Industrial Association data, enterprises in Forest Industry in Bulgaria show next results: (BIA, 2015)

##### ***Quality management***

- Introduced foreign technology - 53% of the enterprises;
- Introduced an international standard - 45% of the enterprises;
- Neither international standard nor any other technology is introduced - 35% of the enterprises.

##### ***ICT***

- Integrated system for managing almost all processes - 21% of the enterprises;
- Another type of process management system - 15% of the enterprises;
- Customer Relationship Management Systems - 12% of the enterprises;
- Supply Management System - 9% of the enterprises;

***Financing*** - 2/3 of the enterprises used own funds and 1/3 - external financing:

- Leases and credits - 30% of the enterprises;
- Special purpose credits - 20% of enterprises;
- Loan from friends and family - 27% of the enterprises;
- Funding by European funds - 23% of the enterprises.

##### ***Marketing***

- Marketing strategy - 45% of the enterprises;
- Integrated marketing communications – 41% of the enterprises;

- Lack of any skills and knowledge in the field of branding - 41% of enterprises.

### ***Internet***

- Website - 97% of the enterprises;
- Online Orders & Sales - 30% of the enterprises;
- Online payments - 42% of the enterprises;
- Electronic Signature - 76% of the enterprises.

### ***Internationalization***

Export - 63% of the enterprises:

- Direct export - 61% of the enterprises;
- Export through large retail chains - 30% of the enterprises;
- Export through wholesalers - 9% - of the enterprises.

### ***Innovations***

- Lack of competence to manage innovation - 65% of the enterprises;
- Joint initiatives with academic organizations - 42% of the enterprises;
- R & D department or unit - 24% of the enterprises;
- Collaboration with research associates and institutes to develop new products - 15% of the enterprises;
- Specialized training of employees in the field of topical innovations in the branch - 18% of the enterprises;
- Lack of sufficient financial resources to finance innovation activity - 18% of the enterprises.

## 5. Main problems of the Forest Industry enterprises in Bulgaria

A discussion with representatives of the Furniture Industry in 2016 shows that the main problems of the enterprises are:

- **Problems with delivery of raw material** (needs to improve forest management and introduction of responsible purchasing policies; needs to improve supply chain management; needs to improve of technologies for more efficient use of raw materials and recycling efficiency; needs to improve a forest roads);
- **Lack of qualified staff** (unattractive work and working conditions in the sector; low level of payment in the sector; difficulties in the career development of women working in the sector)
- **Low export readiness** (Insufficient information about business opportunities of the branches, Inadequate management skills in the sector; );
- **Lack of information** (Lack of information about the registration of patents and other forms of protection of the industrial property; Lack of information about standards ;)
- **Unused potential of cooperation** (unused forest potential for development of clusters in the chain - logging – woodworking – furniture; unfused potential for cooperation with research institutions, links with European networks; unfused potential for cooperation in EU programs and projects).

## 6. Conclusions and recommendations

The analyzes of the state of Forest Industry in Bulgaria allow highlighting the main **strategic areas** affecting forest business development. Among them are:

- *Management* - Operations management, Quality Management, Supply Chain Management including Planning, Supply Relationship Management, Customer Relationship Management;
- *Technologies and Information* – Information for new materials, new products and production technologies, Information for standards, protection of industrial property; Information for good practices in the Forest Industry;

- *Innovation and cooperation* - Innovations collaboration with research associates and institutes to develop new products and creating conditions for the development of clusters in the main chain *logging – woodworking – furniture*.

Therefore it is necessary:

- **The improvement of management** (e.g., more effective implementation of policies and practices);
- **The improvement of technologies** (e.g., more efficient use of raw materials and recycling efficiency);
- **The improvement of information** (e.g., using digital platforms for virtual business and education in Forestry - VOFIS.bg and VEF.bg);
- **The innovation cooperation** with enterprises and universities in EU programs and projects (e.g., manufacturing and design of new products and technological upgrading).

**In the firm level**, the experts in furniture manufacturing make a main recommendation about the modern furniture factory – about components and processes, information systems and people. (Raymond & Company, 2009)

First comes the **marketing plan** - that document must precede any work on plant design and define your target customers, target products and volumes, and value proposition. From that basic strategic information the factory owner must define what the factory's manufacturing task is, what the factory must do well to support the company's plan. As it is important, the manufacture using task must state what the plant will not do.

Next the manufacturing task must be screened against four basic principles:

- *Value Chain Efficiency* – The factory is a small part of the value chain. Achieving efficiency is not only the responsibility of the plant manager but also the job of the entire company from the corner office down through marketing, sales, finance, and human resources as well as every link in the value chain from raw material suppliers to logistics providers and finally to the resellers. A factory, no matter how efficient, cannot make up for friction and bad decisions through the rest of the value chain.
- *Focus*– The factory must be focused. A factory can only achieve a limited number of objectives. You cannot simultaneously optimize all of the usual performance metrics applied to manufacturing operations. Thus in a modern factory, the product line and

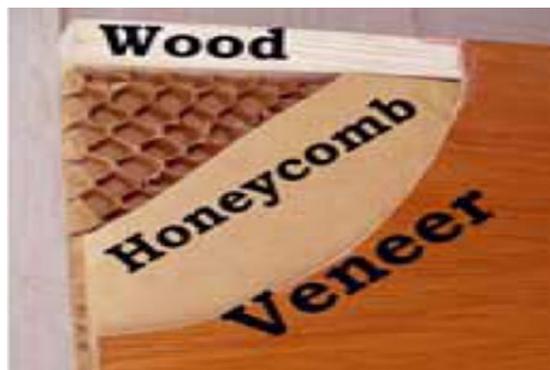
volumes to be built, the technologies employed, and the markets served must be narrowly defined and continuously managed.

- *Production Alternatives* – Many operational alternatives exist. Planners must open their minds to all of the possibilities of factory scale, scope, location, and organizational structure. There are lots of niches, combinations of products and markets, that can be served and lots of ways to serve them. The factory can be large and fully integrated, small and dependent on its supply chain, or any combination in between.
- *Simplicity* – Its processes must be simple. Focus provides simplicity, simplicity enables repetition, and repetition breeds competency. A well-designed process must remove the difficulty of getting things done. That means eliminating waste. Using lean manufacturing philosophies to drive out waste is a critical part of the design of any modern factory.

Once, the manufacturing task is set, the next step is to assemble the key components into a conceptual factory design. These components are technology, suppliers, space and people. . (Raymond & Company, 2009)

**Technology.** Great technologies cover the waterfront of needs required to build a modern factory:

- *Materials* – examples are lightweight panels with honeycomb cores that minimize material content and save transport cost. High tech waterborne coatings are available to eliminate harmful pollutants;



- *Process Machinery* – has a choice of machinery depending on your manufacturing task. Some plants need highly flexible Part Machining Centers like those shown. These machines can efficiently produce one discrete part then automatically change over for another part configuration in seconds. Alternatively if the manufacturing task calls for high

production, you can select High Speed Integrated Lines like those shown on page -- that can produce 30 identical parts per minute.

*Five-Axis Machining*



*CNC-Controlled Drilling*



- *Material Handling Equipment*– a key part of any modern factory is effective material handling like fork lifts that handle long loads in narrow aisles and robots that feed machines.

*Narrow Aisle Fork Lift*



*Robot feeder*



- *Information Systems* – computerized tools that allow to manage the production hardware include: Purchasing System for material procurement and inventory control; Execution System for controlling production; Product System to engineer/specify products and Measurement System to publicize performance.

**Suppliers.** A key decision in designing a modern factory is selecting what materials and components will make internally or buy from specialty suppliers. The factory will always

choose to do what it can do well and buy the rest. Often that choice depends heavily on the availability of capital and talent. Most companies do not have an infinite equipment budget nor do they have the range of skills to manage and execute every necessary process. Why not let specialty suppliers make the capital investments and hire the skilled front line workers and experienced managers necessary to fabricate certain components?

**Space.** A true factory will have its processes located on a purpose-built site and housed in a purpose-built structure. Only by physically organizing the required processes in the optimal configuration can a factory's performance also be optimized. By doing so, the access points, doors, walls, columns, ceiling heights, utility entrances, safety requirements, and other features can be located so as not to compromise operating efficiency. While a new factory may not be attempting to be the low cost producer in its market niche, it doesn't want to be the high cost producer either.

**People.** The success of any factory depends primarily on the quality of its work force. To generate those qualities, the factory's management must:

- Conduct formal employee education programs;
- Foster leadership skills;
- Empower the front line workers;
- Publish their key performance metrics;
- Pay for new skills;
- Develop a bias for change and action.

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