

# **Analyzing and Forecasting the Russian Market for MHG Systems Oy**

Wood Pellet Production in Russia

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Bachelor's Thesis

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Field of Study Technology, Communication and Transport			
Degree Programme Degree Programme in Industrial Management			
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Title of Thesis Analyzing and Forecasting the Russian Market for MHG Systems Oy. Wood Pellet Production in Russia.			
Date	24.3.2016	Pages/Appendices	50 + 6
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Client Organisation/Partners Savonia UAS, MHG Systems Oy			
Abstract  <p>This study is aimed to evaluate the Russian market of ERP-solutions within the framework of wood pellet production solutions. The research was performed for the company MHG Systems Oy. The survey involves Russian wood pellet market players' analysis, competitor analysis, and determination of an enterprise resource planning system value for the wood pellet producers.</p> <p>The research was based on statistical data of information and analytical agencies, governmental statistical data, articles and researches related to the sphere of bioenergy industry and enterprise resource planning solutions, and companies' interviews. The results of the study are considered to be trustworthy due to reliable information sources and data analysis.</p> <p>The validity of information is considered to last for half a year due to continuous changes of the situation in the biofuel production industry and the currency exchange rate. Nevertheless, a continuous analysis of up-to-date information is required to be performed at a high-efficiency rate.</p>			
Keywords MHG Systems Oy, ERP, market analysis, bioenergy, wood pellet, Russia			

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## 1 INTRODUCTION

This thesis was aimed to research and analyze the wood pellet production market of the Russian Federation and evaluate the country's market of enterprise resource planning systems used in Russia. The research was performed for the company MHG Systems Oy. The main target of the research was to make a clear picture of the development of wood pellet production industry and evaluate the market players. Another important goal was to define the need of usage of an enterprise resource planning system (ERP-system) in the wood pellet production industry and its value for the market players. It included the evaluation of the leading ERP-systems' producers and the ERP-solutions represented on the Russian market.

The research was applied only to the Russian wood pellet production branch of bioenergy industry. The evaluation of existing ERP-solutions of the Russian market referred to comparative evaluation and was applied only to the ERP-solutions specialized for the bioenergy production industry.

The thesis includes the theoretical information on the wood pellet production process, overall information about the market analysis, data regarding the situation of bioenergy production in Russia, analysis of the current situation in the market of wood pellets and in the market of ERP-systems of Russia.

The research is based on statistical data of information and analytical agencies (IAA), governmental statistical data, articles and researches related to the sphere of bioenergy industry and ERP-solutions, and companies' interviews.

## 2 MHG SYSTEMS OY

Enterprise resource planning (ERP) serves as a practical and trustworthy tool for the real-time control of a company's processes and assets which include manufacturing, supply chain, human resources, fuel consumption, financials, and reporting. The integrated system allows the user-company to improve the performance while effectively using all the resources available and acting in a cost-efficient way. Such system may be easily deployed or integrated into an existing control system of a company.

MHG Systems Oy is one of the world's suppliers of ERP-systems specialized in forestry and biomass business. Dealing with the integration of an open software technology the company facilitates flexible and resilient business models in a rapidly changing business environment. MHG Biomass Manager – software enterprise resource planning solution for bioenergy production – contributes to the prosperity and development of many biomass industry companies located in Europe, Africa, Great Britain and the USA. MHG Systems Oy is focused on the expansion of the consumer market to the Russian biomass industry sector on purpose to facilitate the production and logistics processes of the Russian-side industrial players, focused primarily on the wood pellet producers.

### 2.1 Company Description

MHG Systems Oy is one of the world's suppliers of Bioenergy ERP-systems. The company utilizes its partner network to produce customer-oriented automation, ICT and map service solutions designed for timber, bioenergy, and field work business operations. The company's services bring a significant contribution to all operators in the field of forestry and bioenergy. The MHG platform services allow development of new, empowering operational models resulting in paper-free office and field work.



Figure 1. MHG Systems Oy logo. (MHG Systems Oy)

MHG Systems Oy was founded in the year 2005 as an ICT company providing services. In collaboration with MikTech, the office was based in the building of Mikpoli in Mikkeli where it is located at the present. Mr. Seppo Huurinainen (CEO) realized that it is not possible to efficiently control the Biomass processes relying on the supply chain processes only. He assembled an ICT team on purpose to create the solution for control of the biomass flow from the place of origin to the end-user. With 10 years of experience in the Biomass industry, the company is now able to provide a wide range of optimized and regularly updated Enterprise Resource Planning software systems available in 13 languages. In addition to the software services, the company provides its customers with consultation and training in forestry and bioenergy business and resource and supply chain management, as well as, in modern ICT, geographic information system (GIS), and mobile technology. (MHG Systems Oy, 2015)

## 2.2 Services Provided by the Company

Innovative mobile and web technologies merge in the MHG System's services. The services are worked out by the means of open source technologies enabling most cost-effective usage and integration into an existing information system of a company ensuring a seamless information flow of business processes.

The software distribution is processed through the SaaS model. Software-as-a-Service allows the easy availability, global accessibility, and automatic updates. Centrally hosted software is licensed on a subscription basis. Service environment offers an enterprise qualified performance, memory capacity, storage memory, and connection to well-equipped and modern data centers. It also includes service unique firewall services and stress management. Dynamic, fully virtualized ICT-infrastructure environment is easily scalable up or down. Parts of physical and virtual infrastructure can be combined depending on your requirements for the service. For producing the SaaS services MHG Systems uses the Infrastructure-as-a-Service provided by TelecityGroup Finland Oy. TelecityGroup is the leading first class operator neutral data center provider. TelecityGroup's server rooms are located in cities around Europe. (MHG Systems Oy, 2015)



### 2.2.1 MHG Biomass Manager

MHG Biomass Manager is a complete solution for bioenergy production, managing, harvesting, and logistics. The tool is used for real-time storage management, work management, mobile management and control of all feedstock and forest resources, procurement and supply activities. It is the service for end-to-end automation of entire timber and biomass supply chain that is Internet Cloud based.

With the MHG Biomass Manager an enterprise is able to handle all timber and biomass business operations, right through from material buying, harvesting, contracts, storages, chipping, transporting, terminals, delivery points, and quality monitoring.

MHG Biomass Manager:

1. Provides control of feedstock and company resources
2. Helps to use the resources more efficiently hence decrease the costs
3. Provides the real-time control and monitoring
4. Works off-line (Internet connection not needed)
5. Everything goes mobile
6. Enables new business practices.

A company which uses the MHG Biomass Manager gets wide range of opportunities such as:

1. New business models based on outsourcing and information sharing in real-time operations
2. Networking of small producers to become trustworthy to end-users
3. Reliable outsourcing of all operations while maintaining overall control of operations related to biomass procurement and supply
4. Easy biomass info sharing, deals and optimization between producers, cooperatives, brokers, and end-users
5. Biomass quality, quantity and energy content control through all stages of supply chain
6. Securing economic sustainability while tracking expenses and profits of all operations process by process
7. Front-end solution i.e. integration to existing IT-systems (SAP etc.) through standard interfaces.

### 2.2.2 MHG Mobile

MHG Systems Mobile tools facilitate more intelligent and productive business models. With mobile software solutions, it is possible to manage forest assets and material and

human resources in real-time. Mobile data transfer and operations management between cooperative partners help daily business processes and customer service. MHG mobile solutions require Biomass Manager for operative planning and management. Mobile tools facilitate both operative management to field workers and up-to-date data transfer from field to the system. (MHG Systems Oy, 2015)

### 2.2.3 Woodland Manager

This mobile and Internet Cloud service was launched specially for forest owners' and managers' mobile devices. The MHG Systems Mobile Manager helps create forest management plans. The newly launched service gives forest owners a tool to take control of their own forest resource management and to take active control of their own forest resources. As a mobile and internet cloud service, [www.woodlandmanager.com](http://www.woodlandmanager.com) brings forest management plans conveniently up to date. Forest owners can easily see what operations need to be carried out and how much money they may be able to get from harvesting, immediately or in the near future. (MHG Systems Oy, 2015)

### 2.2.4 MHG Consultancy Services

The following chapter contains the information regarding MHG Systems' consultancy services available for the customers of the company.

#### *2.2.4.1 Training*

MHG Systems realizes that the deployment of new information systems leads to changes in work methods. The use of new information and management services requires training. MHG Systems makes an individual approach to every case depending on clients' needs. This involves training of staff in feedstock mapping, mobile feedstock quality and quantity monitoring and reporting, deliveries tracking, planning, and inventory management. (MHG Systems Oy, 2015)

#### *2.2.4.2 IT Performance Evaluation*

Planning and well-defined advantages and benefits expected are required for understanding the full potential of ICT investments. Successful companies have the

systematic expertise and ICT administration strategies that allow them to achieve the required ICT functionalities regardless of market conditions change.

MHG Systems helps its customers to evaluate the information technology capacity grounded on an understanding of bottlenecks or reoccurring the supply chain problems. Common focus areas serve as a tool for evaluation of the potential of integrated data sharing with the growing supply network. Improvement of information flow quality, control quality, and service quality are being done. At the same time, MHG Systems helps to define areas where IT costs on transactions may be reduced and how to reduce overall IT costs in long-term perspective.

#### *2.2.4.3 Sustainability and Process Innovation*

MHG Systems follows the latest changes in policy and technology developments in the sphere of bioenergy industry on purpose to apply these in the services provided. The development of functionality of feedstock origin tracking in compliance with chain of custody legislation, integration of transport costs and emissions may serve as good examples of service improvements made by MHG Systems.

### 2.3 Customers and Clients

Since MHG Systems specializes in the ERP services provided for Bioenergy and Forestry industries the main customers appear to be the players of these industry spheres. MHG Systems is looking for companies which want to empower their biomass business by incorporating fresh business models, best practice, and modern IT solutions into their current practices. MHG Systems' services are targeted especially at companies operating in the following sectors: energy, biofuels, recycling, electricity and heating (the forest industry, energy utilities, fuel suppliers, pellet producers, municipalities' forest departments, and forest companies).

The company's clientele includes pulp and paper, agro- and forestry-based heat/electricity and biofuel industry players. The list of customer-countries includes the United Kingdom, the USA, Pakistan, some European countries such as Finland, Italy,

France, Spain, and others. At the moment, the company is interested in entering the Russian market having its main focus on pellet production, the bioenergy industry.

#### 2.4 Values of MHG Systems Oy and its Targets

Main tasks the company possesses:

1. Simplification of company's control of processes
2. Real-time control of company's resources
3. Cost monitoring
4. Genuineness of documentation and reporting, avoiding illegal practices
5. Sustainability
6. Predicting the risks and opportunities that arise from the implementation of modern technology solutions
7. Feedstock optimization and helping companies add value
8. Constant development of Bioenergy and Forestry industries.

Values of MHG Systems are:

1. Constant development of business operations
2. Significant cost savings
3. Environmental benefits
4. Social and environmental responsibility of operations
5. Help companies meet new EU bioenergy certification standards
6. The company is ready to share its great experience, strategies, and know-how in the field of its expertise.

### 3 GENERAL PELLETIZING PROCESS

Pelletizing consists of a certain range of processes. For example, the preliminary drying process may be included or excluded depending on the sawdust brought to a pellet factory. If the sawdust brought is already dried it increases the cost of the material. The other option is pelletizing excluding discrete drying while losing the quality of the final product. The main pelletizing stages are described below in accordance to the academic dissertation of Matti Kuokkanen presented with the assent of the Doctoral Training Committee of Technology and Natural Sciences of the University of Oulu for public defense in Wetteri-sali.

#### 3.1 Raw Material Delivery

Perfect location of a pellet factory is near a sawmill. This case brings significant cost efficiency related to the raw material delivery expenses. The by-products of a sawmill would serve as the raw material of the close located pellet production facility. Thus, closely located manufacturing facilities create a symbiosis which brings benefits to both sides.

The first phase in pellet production is preheating of the raw material, based on the recycling waste heat from the later stages of the process. This helps to save energy in the drying phase, especially in winter when the raw material may be covered with ice or snow. After preheating the material is fed to the receiving silos by a pneumatic blower. (Kuokkanen, 2013)

#### 3.2 Drying and Pretreatment

The preheated wet sawdust is moved straight to a drying unit by conveyors. In the drying unit, moisture is removed from the raw material and the general waste heat is used to heat the receiving silos. The drying temperature varies from 100 °C to 380 °C depending on the quality and humidity of the material. Drying is processed until the moisture content reaches the level of 15% or less.

After drying the first phase of dust separation takes place. Several phases of dust separation are important in order to reach good quality of the end-product. The next

step before being fed to the pelletizing machine is crushing of the raw material to make the homogenous mass. This is done in order to avoid blockages in the pelletizing machine. (Kuokkanen, 2013)

### 3.3 Pelletizing

The dried and crushed saw dust is fed to the pelletizing machine by the conveyors. The machine feeds the material into a pellet press. Pelletizing is a mechanical pressure operation, the high pressure and friction of the press causes the temperature of the wood to increase significantly, thus slightly plasticizing. (Kuokkanen, 2013)

There are three common types of pelletizing machines: core matrix machine (Figure 2, Figure 3), plain matrix machine (Figure 4, Figure 5) and press with two cylindrical matrices (Figure 6).

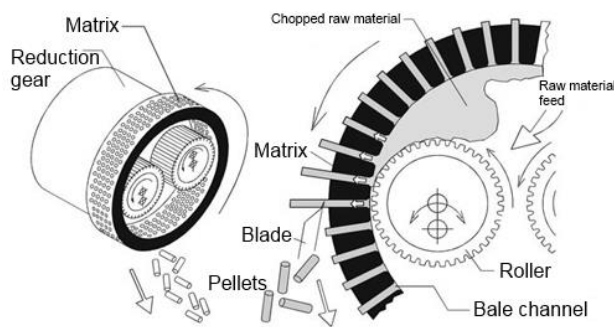


Figure 2. Core matrix machine

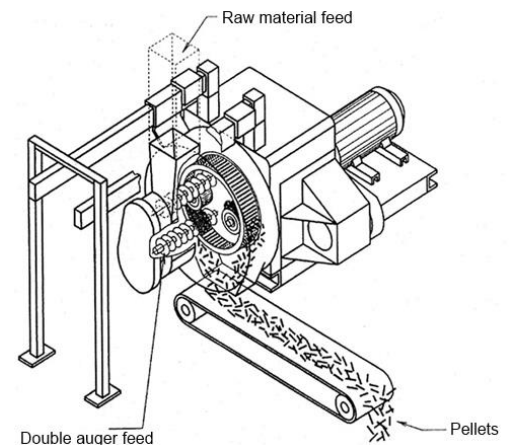


Figure 3. Core matrix machine

The principle of operation is following: the running rolls create the contact bearing stress of raw material compression on the matrix. The compressed raw material is pressed through the holes in the matrix and then cut by the knives. (Bespalova, et al., 2013)

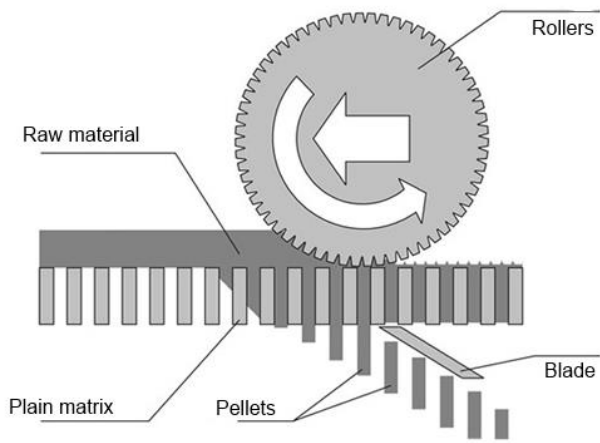


Figure 4. Plain matrix machine

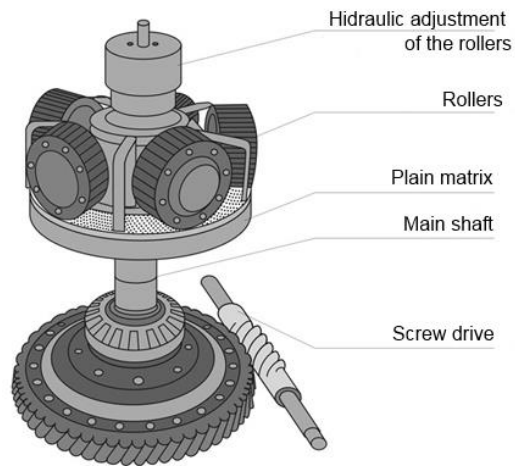


Figure 5. Plain matrix machine

The disadvantage of such machines is a relatively rapid failure of the matrix. The matrices of the press machine with two cylindrical matrices (Figure 6) are much thicker (100mm), they contain 6 times more holes and according to that these matrices are in use for a longer period of time. Due to special pressing it is possible to obtain pellets of hardwood without binder, humidity 20%. (Bespalova, et al., 2013)

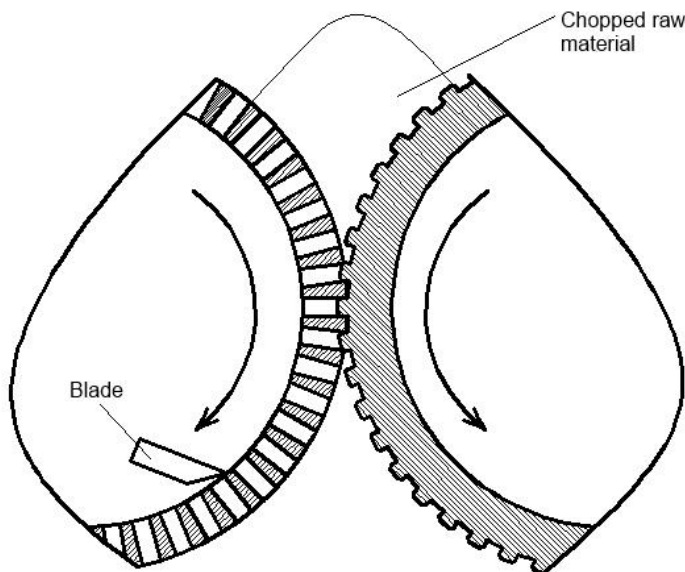


Figure 6. Press with two cylindrical matrices

Among other stages of the pelletizing process there are humidity control, cooling, quality control and packaging. The more precise and detailed picture of the pelletizing process may be found in the Appendix 1.

## 4 BIOENERGY AND PRODUCTION OF WOOD PELLETS IN RUSSIA

### 4.1 Bioenergy Industry in Russia

Current energy problems can only be solved by the rational use of all existing Earth sources of fuel and energy. The biomass serving as a constantly renewable source of energy is among them and occupies a prominent place. The figure below (Figure 7) presents the primary sources of energy biomass in Russia.

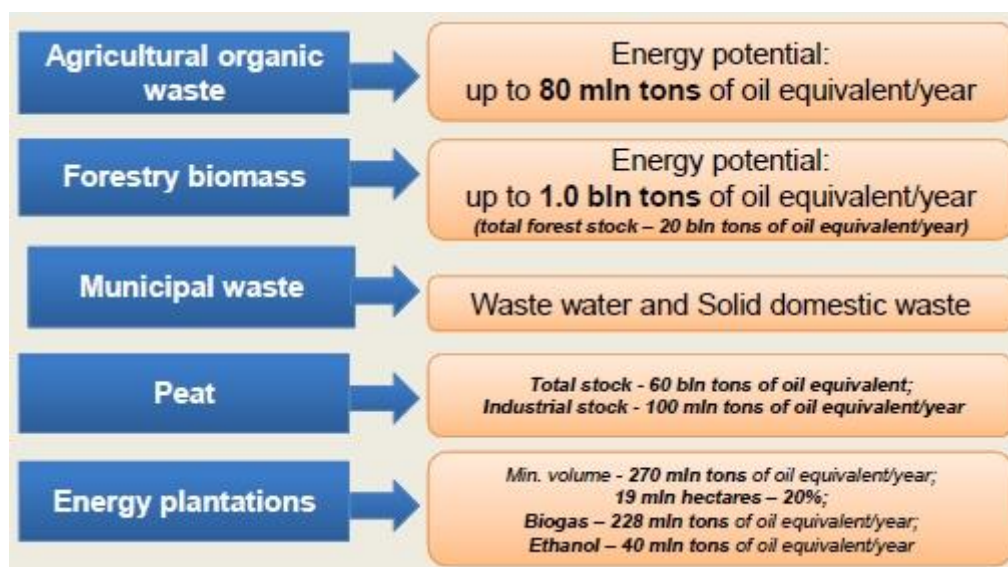


Figure 7. Main sources of energy biomass in Russia. (Bioenergy in Russia: Resources, Technologies and Development Priorities, 2013)

The purpose of development of bioenergy industry in Russia:

1. Development of market and of production of bioenergy equipment and technologies for reliable autonomous environmentally friendly energy supply in areas not connected to the networks of centralized power supply
2. Development of efficient technologies of network electricity and heat supply based on renewable energy
3. Expansion of production and use of new types of fuels derived from various types of biomass
4. Enhancing the environmental security in local areas i.e. decreasing emissions from power plants and heat supply stations in cities with difficult environmental conditions.

On the 24<sup>th</sup> of April 2012 the State Coordination Program for the Development of Biotechnology in the Russian Federation until 2020 "BIO 2020" was approved. Main



participants of the development of "BIO 2020" were three Russian Technology Platforms: "Bioindustry and Bioresources – BioTech2030", "Bioenergetics" and "Medicine of the Future". The work under the Program "BIO 2020" is held with the participation of leading experts in biotechnology: representatives of federal bodies of executive power, scientific, educational and business communities. (Russian Technology Platform "BioTech2030") The figure below (Figure 8) shows the estimated financing needs for the program BIO 2020 for the period 2011-2020, bln. rub.

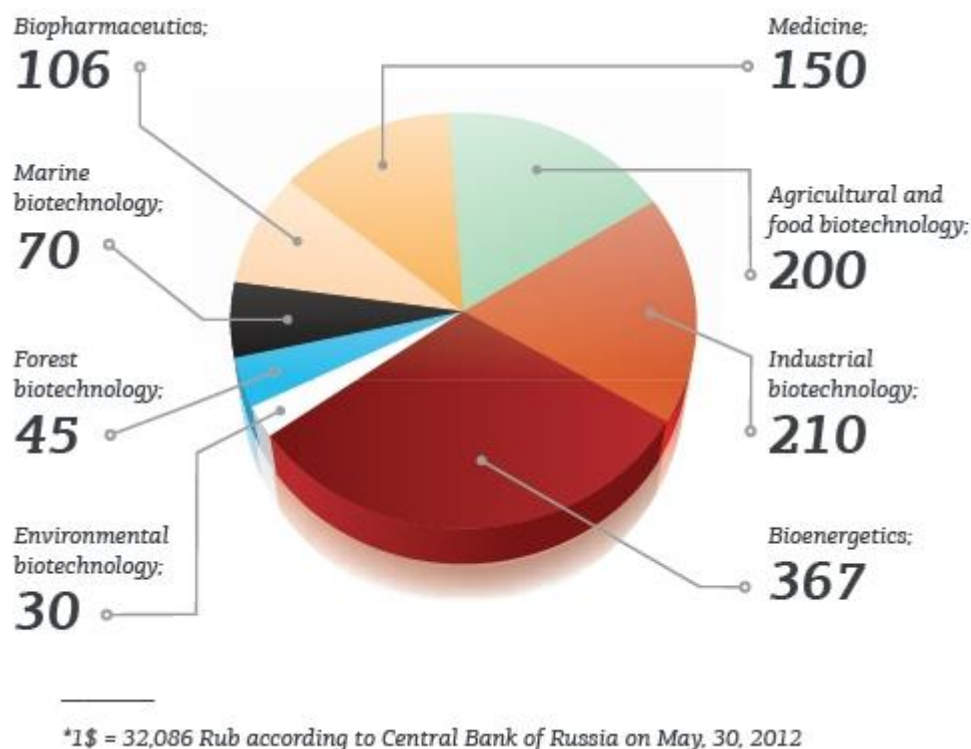


Figure 8. Estimated financing needs for the program BIO 2020 for the period 2011-2020, bln. rub. (Russian Technology Platform "BioTech2030")

Potential volumes of biomass biofuel production in Russia in the next decade can make in a year about 1.5 billion tons of oil equivalent / year, and will not yield to the volume of annual production of oil, coal or natural gas, Russian energy balance of which is more than 1.6 billion tons of oil equivalent / year. (Pantshava E.S., 2008) Potential energy opportunities of Russia in the field of bioenergy are superior to those of any country in the world. The country may become a major exporter of certain types of bioenergy in the case of intensive development of this energy sector. The assessment of the volumes of organic waste of Agroindustrial complex and Forestry complex, conducted by the Institute of Energy Strategy, has established that such types of biofuels as pellets (granules and briquettes) and biogas are universal for all the regions of Russia.

## 4.2 Pellet Production in Russia

Area of the Russian Federation is 45% covered with forests which form 25% of the global forest resources. Hence, the forestry and bioenergy industry sectors are highly developed, thousands of companies in Russia are providing the World with timber, lumber, paper products and biofuel. The companies are growing and production technologies have been developing rapidly especially in the end of 20<sup>th</sup> – beginning of the 21<sup>st</sup> century. Special tools and services are being developed in order to regulate, elaborate and maximize the productivity, reduce the expenses and control the resource income and outcome. The companies tend to apply high-tech technologies to gain total control of all processes and resources in order to thrive and develop.

Wood pellet production is a relatively new industry which is rapidly developing worldwide and the demand is increasing yearly. The global demand for wood pellets set to double over the next decade. "The annual report recently filed with the USDA Foreign Agricultural Service's Global Agricultural Information Network indicates that Russia is currently the third largest exporter of wood pellets to the EU, following the U.S. and Canada. The Russian Customs Service has reported 2014 pellet exports of 880 000 metric tons. In the year 2015, at least, four new wood pellet facilities are under construction in Russia with a combined capacity of 500,000 metric tons." (Voegele, 2015)

At the present time, the production of wood- and peat pellets is being rapidly developed. The production of these energy sources is deployed in the following regions of Russia: Komi republic, Republic of Karelia, Archangelsk Oblast, Vologda Oblast, Leningrad Oblast, Pskov Oblast, Nizhny Novgorod Oblast, Novgorod Oblast, Tver Oblast, Vladimir Oblast, Kirov Oblast, Kostroma Oblast, Sverdlovsk Oblast, Krasnoyarsk Krai and Khabarovsk Krai.

In the year 2010, pellet production capacity in Russia amounted to 2 million tons per year, the release of the pellets made of husk and wood according to several estimates varies from 700 thousand up to 1 million tons per year, most of which was exported to Europe. Moreover, if the wood pellets tend to be bought the Nordic countries and Central and Northern Europe, the pellets made from the husks are purchased only by the United Kingdom and Poland. Production and export of briquettes are constantly growing. According to Eurostat, in 2009, the export of Russian briquettes made about 300 thousand tons.



Figure 9. Pellet samples and briquette samples. (Before it's news, 2012)

Russia may become a major exporter of biofuels, such as wood chips and wood pellets to Europe and other countries. Every year, Russia harvests only 130 million cubic meters of wood, but this figure could be increased to 550 million cubic meters (or 275 million tons). In this case, the waste will amount to 40% or 370 million cubic meters (185 million tons) with an energy content of up to  $2.29 \times 10^{18}$  Joules. Straw cereals and cereal crops, mass storage of which is 80-100 million tons per year, can be used for the production of pellets. Even in the case of usage of only half of this amount for the production of pellets, it is possible to obtain up to 1.2 billion euros through exports. However, the establishment of production facilities and infrastructure needs very large investments. Thus, the potential for the production and export of pellets per year to Russia could reach EUR 7.8 billion. In the North-West region of Russia, domestic companies that produce wood pellets and exporting them to the West are already successfully operating.

The following giant plants stand out among the more than 100 existing Russian pellet production plants:

1. Production of wood pellets in the Leningrad Oblast in Sovetsky – JSC "Vyborgskaya Cellulose" – with a project volume capacity of 1 million tons of wood pellets per year.
2. The launch of the second large pellet production in the Krasnoyarsk Krai – Novoyeniseiskiy Wood-Chemical complex with the capacity of 60 thousand tons of pellets per year (2010). Krasnoyarsk Krai becomes a leader in the production of fuel pellets in Russia. In 2010, the plant "Yenisei" has exported 120 thousand tons of pellets.

3. "Sawmill 25" in the Arkhangelsk Oblast with the production of 100 thousand tons per year.
4. Factory "Taleon Terra" belonging "STOD" LLC, the capacity of 80 thousand tons per year in the Tver region, Torzhok.
5. RusForest has started the production of wood pellets at the site of Arkhangelsk enterprise "LDK-3". The annual planned capacity of the plant – 100 thousand tons per year.

Among other planned or under construction companies with production capacity of not less than 100 thousand tons per year are: TSLK and "Russian Timber Group" (both companies are located in the Irkutsk Oblast), "Aziya Les" (Khabarovsk Krai), "GS Group" (Pskov Oblast), "Bionet" (Arkhangelsk Oblast), CG "Synthes" (Bryansk Oblast), etc. Thus, we can conclude that the main investment activity in the production of pellets in Russia is shifting from the North-West in the direction of Siberia. (Forest Online. Forestry industry., 2015)

#### 4.3 The Supply Chain in the Russian Pellet Industry

The information regarding the pellet supply chain is available from multiple sources but, unfortunately, there is no dedicated study on this issue. The picture below (Figure 10) shows the general pellet industry phase by phase.

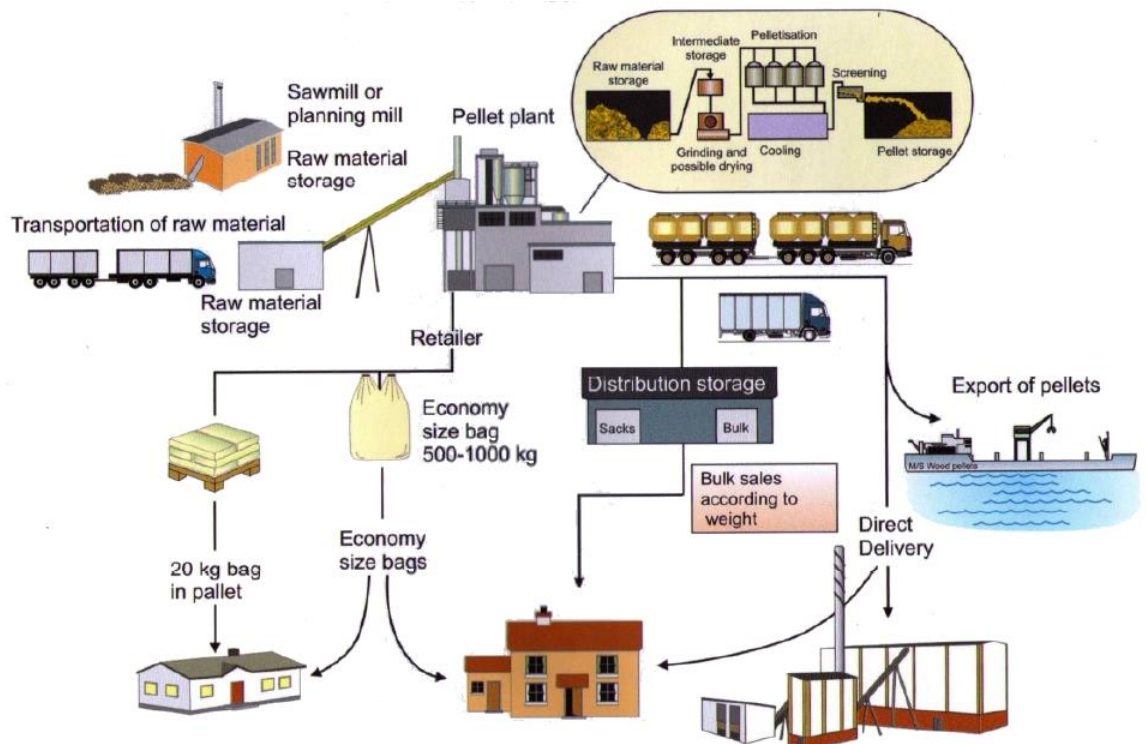


Figure 10. Pellet production and trading. (EUBIA – European Biomass Industry Association, 2009)

Generally, the biomass is collected locally at smaller scale production sites and then transported to a cargo gathering point. Local transportation is processed by truck, longer distance transportation is done by train or ship.

#### 4.3.1 Basic Means of Transportation

Road transportation is the most expensive but the most flexible and simplest delivery method. From the financial point of view forest fuels' transportation by truck is profitable at approximately 60-100 km, depending on the logistics system and the material transported. Truck transportation of pellets over more than 200-300 km is not economically efficient due to high transportation expenses in relation to low product costs. This is the reason why pellet manufacturers try to locate the manufacturing close to local wood and timber industries. (EUBIA – European Biomass Industry Association, 2009)

Compared to truck transportation low level of environmental friendliness and small cargo capacities train transport allows greater transportation capacities and should be preferred for the medium distances between big plants, for example between a pellet production plant and a power plant. Due to the large area of Russia train transportation is profitable to be used in both cases – transportation across the country and beyond its borders – export.

“Sea transportation is the most economical way of pellet shipping over long distances. The expansion of 2<sup>nd</sup> generation biofuels in the future will increase the biomass demand therefore also the long distance transport of biomass that will increase demands on maritime shipping capacity.” (EUBIA – European Biomass Industry Association, 2009) Major buyers of pellets have special terminals and loading and unloading systems for the pellet handling. These systems allow flexibility to the pellet handling and logistics operations. Before loading or after unloading the pellets are stored in special warehouses.

#### 4.3.2 Types of Packaging for Distribution

Depending on a customer's wish pellets may be distributed in the following ways:

1. Small bags (15- 25 kg, sold and delivered on pallets of 800 kg or as single bags).

This kind of package is appropriate for minimal pellet consumption, e.g. when pellet stoves are used only for auxiliary heating. Consumers buy the pellets in household goods stores, filling stations or agricultural supply stores and transport them to their homes on their own. The advantage of pellets sale in sacks is that the amount of fines in the fuel is very low provided that the sacks are handled properly and the pellets are protected against wetness. However, pellet prices in this package form are much higher than the purchase of loose pellets. (EUBIA – European Biomass Industry Association, 2009) Small bags packaging does not hold a big share of the market and is basically sold in retail. Usually, such packaging is used for best quality pellets to be sold to end-customers.



Figure 11. Wood pellet sacks. (Eden Products, 2016)

2. Big bags (with 1 to 1.5 m<sup>3</sup> content).

Most manufacturers also offer pellets in this way. Big bags have to be moved by stacker truck, tractor front-loader or crane, which is inconvenient, especially for transport to the end consumer, so this transport form is used mostly for transport of pellets to retailers. (EUBIA – European Biomass Industry Association, 2009) On the other, hand such packaging method provides effective material protection during the handling process.





Figure 12. Wood pellet big-bag loading to a truck. (WARMESTON OÜ, 2016)

3. Bulk material (delivered in a tanker and pneumatic filling of storage bunker or silos).

This kind of delivery is becoming the main pellet distribution form in Europe. Handling is similar to fuel oil delivery and meets the convenience requirements of customers and retailers alike. (EUBIA – European Biomass Industry Association, 2009) Such kind of handling allows great logistics flexibility at low expenses level.



Figure 13. Wood pellet bulk material loading. (Canadian Biomass, 2011)

The logistics of wood pellets – distribution, transportation and delivery – is one of the most sensitive areas in the marketing of wood pellets at the moment. Areas, where improvements could be made, include costs, quality, and customer convenience. (EUBIA – European Biomass Industry Association, 2009)

#### 4.3.3 Typical Export Delivery Schemes

The table below (Table 1) shows examples of Russian typical pellet deliveries.

	Situation	Solution
1	Small production in the European part of Russia. High-quality pellets	Big bags or pallet small bags by trucks directly to retailers in WE (Germany, Austria, Italy etc.)
2	Small production in the European part of Russia. Industrial pellets. No railroad in the neighborhood	Big bags by trucks to a seaport (St. Petersburg, Klaipeda, Liepaja, Paldiski, Ventspils etc.) Reloading in bulk or in big bags. Sea transport to seaports in WE (mainly Northern Europe)
3	Small production in the European part of Russia. Industrial pellets. Railroad in the neighborhood	Big bags by railroad. Sometimes also bulk rail cars to a seaport (St. Petersburg, Klaipeda, Liepaja, Paldiski, Ventspils etc.) Reloading in bulk or in big bags. Sea transport to seaports in WE (mainly Northern Europe)
4	Medium sized or bigger producers in the European part of Russia. No railroad in the neighborhood	Big bags to a seaport by trucks (within 300-500 km. range). Or big bags by trucks to a railroad station and to the seaport by railway.
5	Medium sized or bigger producers in the European part of Russia. Railroad in the neighborhood	Big bags by railroad to a seaport.
6	Medium sized or bigger producers close to seaport	Bulk containers (hard or soft) to a seaport.

Table 1. Examples of Russian pellet deliveries. (Rakitova & Ovsyanko, Wood Pellets Production and Trade in Russia, Belarus & Ukraine, 2009)



#### 4.3.4 Supply Chain and Sustainability

Pellets appear to be one of the ways to save carbon dioxide emissions due to the framework of constant climate changes and the development of bioenergy production. Nevertheless, it is important to evaluate the sustainability of the whole supply chain in order to improve the possible weak points.

The pellet supply chain includes 4 main stages:

1. Forest exploitation
2. Sawmill/wood based industry
3. Pellet production
4. End used (e.g. power plant).

In case that distances between the stages are long, the carbon emission level of transportation is very high. This level may even exceed the emissions due to pellet production. The transport and logistics in general, is a very important issue to be considered and improved for larger development of pellets market worldwide because in parallel of the risk of low carbon emission efficiency the bad organization of the market will bring about more costs and, therefore, more expensive prices on the market making pellet less competitive. (EUBIA – European Biomass Industry Association, 2009)

## 5 MARKET ANALYSIS

### 5.1 Market Analysis Theory in Brief

Market research and analysis serves as a vital tool for the purpose to find new customers in a foreign market and define the customers' certain needs and expectations, as well as competitor survey and definition of the own products strengths and weaknesses compared to the competitors' products offered.

#### 5.1.1 Preliminary Definition of Market Analysis Background

In order to process a comprehensive and thorough research, there is a need to define the main aspects. The list of these aspects includes:

1. Research objectives and purposes
2. Target audience
3. Research approach
4. Expectations.

The clear aim of the research leads to a certain set of actions and results in precise and accurate data. Definition of research objective is a vital part of the entire research. After the objectives are determined the next step is the definition of the target audience which implies determining of who the potential customer companies are and what is their industrial sector or practice area. The approach is meant for the techniques and study methods applied for the survey. In order to meet the expectations and purposes of a survey, there is a need to define and understand what exactly is expected from it. Defining clear goals helps to choose certain tools and methods for the survey and to have a clear picture of the aim.

#### 5.1.2 Potential Customer Research

Potential customer research involves analysis of the target industry market players. The analysis is supposed to give answers to such questions as:

1. How many potential customers there are in the market?
2. Where are the potential customers located?
3. Is the number of potential customers growing or decreasing annually?
4. What is the income or the business revenue the leading companies in the industry have? (Baker)

### 5.1.3 Competitor Analysis

Any business strategy should demonstrate awareness and understanding of competition. (Friend & Zehle, 2004) The purpose of competitor analysis is to evaluate competitors of the market, gather information about their products and define their strengths and weaknesses in order to improve efforts within the company and prevent competition. Competitors' strengths and weaknesses are based on presence and absence of key assets needed to compete in the market.

Competitor analysis serves for:

1. Realistic view of your competition
2. Definition of products competing with you
3. Definition of advantages and disadvantages of your product compared to the competitors' products
4. Identifying necessary changes in your processes to meet market demands
5. Identifying ways to attract customers from your competitors
6. Discovering opportunities for the improvement. (nResult)

### 5.1.4 Successful Product Introduction

The first step is gathering data on potential customers from all available sources of information: governmental data, trade association data, financial data from major players and customer surveys.

Secondly, there is a need to gather data on potential customers' needs and requirements in order to create a product proposition that would attract the potential clients.

By identifying a target customer group, a company can identify where significant problems exist and offer a product to solve those problems. Correct market research can improve the chances of a successful product introduction.

## 5.2 Tools and Methods Applied for the Survey

This section describes the methods and tools applied for the survey for the company MHG Systems Oy.

### 5.2.1 Search for Potential Customers

When starting the potential customer research clear understanding of the target audience is supposed to be defined. As soon as the target market customer profile is identified the next step is gathering data on potential customers. Various information channels, such as trade association data sources and government data sources contain the needed information on the leaders of the market, their financial and statistical data, the rate of company growth, etc.

When the data is gathered, there is a need to create a database listing all the companies and its general information, including the following elements (if data is available):

1. Location
2. Size (financial)
3. Amount of employees
4. Position at the market
5. Production rate (home and export).

### 5.2.2 Segmentation

Based on the gathered information it is possible to evaluate and analyze the market and its players. The next step is market segmentation. A benefit of market segmentation could be a higher market share in the segment or the ability to charge a higher price. For segmentation to work in practice, a segment must be identifiable and quantifiable, and it must be possible to address the segment effectively. Some buyers may be happy to pay a higher price for certain attributes. Segments must be measurable, in terms not just of potential market size but also of actual buying behavior. It is important to understand that segmentation is not simply the act of dividing the market into categories, but choose only those which may explain the difference in buyers' behavior. In the business market segmentation schemes are based on the size of the buying organization or the industry sector or a combination of both. (Friend & Zehle, 2004)

There are several segmentation variables applicable to our case:

1. Company size (according to financial data)
  - a. Small
  - b. Medium
  - c. Big
2. Company origin place

- a. Russia
  - b. International
3. Usage of ERP-system and rate of usage
  - a. Company has an ERP-system
  - b. Company does not have an ERP-system
4. ERP-system choice criteria
  - a. Functionality and flexibility
  - b. Price
  - c. Both.

### 5.2.3 Contacting the Potential Customer Companies

The next step is contacting the specialists or decision makers of the companies in order to get specific information which is unavailable from the statistical data sources. This step is basically an interrogation (survey) on the topic of ERP-system availability, usability, definition of advantages and disadvantages of the ERP-system used (if used), research of competitors and definition of the value of an ERP for each potential customer company.

Of course, not all the companies are ready to share the information regarding the internal business processes which means that there is the possibility of information lack. Nevertheless, all the information shared by the companies is supposed to be analyzed jointly with the statistical data in order to choose the strategy of market coverage.

### 5.2.4 Strategy of Market Coverage

The potential customer determines the market coverage strategy. There are three strategies available:

1. Undifferentiated marketing
2. Differentiated marketing
3. Concentrated marketing.

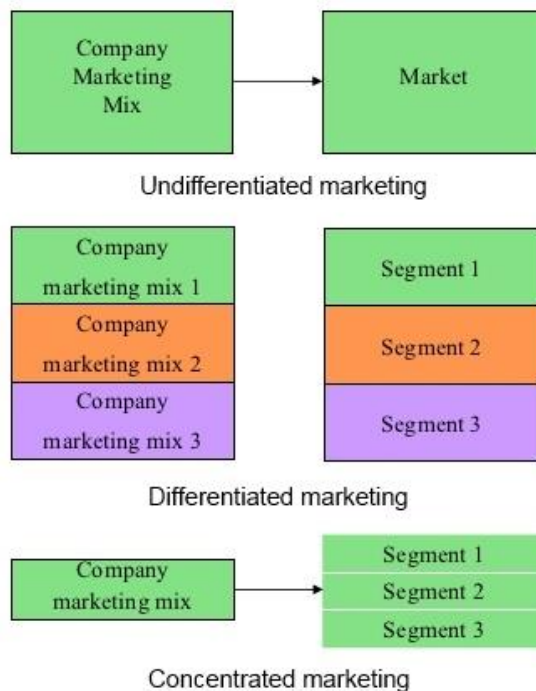


Figure 14. Market coverage strategies. (Drawpack, 2011)

Undifferentiated marketing strategy has the broadest approach when the company ignores differences within a market and attempts to appeal to the whole market. The goal is to focus on the most common consumer needs in the market and is performed by presenting one product to all markets or by presenting all products to one market.

Differentiated marketing strategy stands for separate customized promotional offers specified for several individual market segments. In this case, a company attempts to appeal to two or more clearly defined market segments that are suitable for specific product and unique marketing strategy tailored to each separate segment. Such type of market coverage strategy increases the cost of doing business.

Concentrated marketing strategy stands for development and marketing of a product for a very well-defined, specific segment of the consumer population in order to gain a large share of the small market. (AllBusiness)

#### 5.2.5 Competitor Analysis

Competitor analysis, as well as the market analysis, is based on data found from on-line sources which contain governmental financial data, trade association data. Based on the

gathered information it is possible to evaluate competitor companies and define their market share. The competitor analysis shall be done to achieve the following goals:

1. Identifying opportunities in the market that are under-served
2. Taking advantage of competitors' weaknesses to grow market share
3. Making better-informed decisions about the strategy
4. Creating sustainable competitive advantages. (Beard, 2013)

According to the article "Competitor Analysis Template: 12 Ways to Predict Your Competitors' Behaviors" (Beard, 2013) of Ross Beard, when creating the competitor database the following data is required:

1. Competitor profile
  - a. Overview
  - b. Competitive advantage
2. Marketing profile
  - a. Target market
  - b. Market share
  - c. Marketing strategies
3. Product/Service Profile
  - a. Product/Service Offerings
  - b. Pricing and Costs
  - c. Channels
4. SWOT Profile
  - a. Strengths
  - b. Weaknesses
  - c. Opportunities
  - d. Threats.

The gathered data would allow seeing the clear picture of competition and help to define strengths and weaknesses of the product offered by MHG Systems Oy.

#### 5.2.6 Summary

When all the information is gathered it is possible to analyze the market, seek for potential customers and partners, and evaluate risks and competitors. At the same time understanding the value of ERP for Russian pellet industry market players would allow MHG Systems Oy to create competitive offer specified for the target market.

## 6 RESEARCH DATA AND ANALYSIS

### 6.1 Objectives and Purposes of the Research

The aim of the survey is to evaluate the Russian market players of wood pellet industry sector on purpose to understand if the Russian market is ready for the product produced by MHG Systems Oy. The Russian market is a new business area for MHG Systems Oy that is why the preliminary research is meant to be done.

The research is supposed to give the following data:

1. Overall picture of the pellet industry in Russia
2. Market players and leading companies
3. Value of ERP systems for pellet industry players
4. Competitors in the Russian market of ERP solutions.

### 6.2 Segmentation

MHG Systems Oy is focused on entering the Russian market by offering its solutions to the wood pellet market players of biofuel industry sector. Wood pellet industry is relatively new and very prosperous, especially in Russia. The aim of MHG Systems Oy is to contribute greatly in Russian wood pellet industry development and help its market players do their business more efficiently and sustainably.

Target industry:

Biofuel industry, Russian market

Practical area:

Wood pellet production market

Target market customer profile:

1. Medium or big size company which produces wood pellets for home and export
2. Open for communication and new technologies
3. Is focused on innovation and process modernization.



### 6.3 Research Expectations

The research should give a clear picture of the current situation in the market and define if the Russian pellet industry market is ready for the solutions MHG Systems Oy may offer. At the same time, there is a need to identify Russian ERP systems producers to define competitors or possibility of cooperation and partnership.

### 6.4 Potential Customer Research

This section contains the information regarding the process of research of potential customers. The list of potential customers would be used for the survey and analysis of the usage of ERP-systems in Russian wood pellet production industry.

#### 6.4.1 Location and Industry Growth

The distribution of pellet producers in Russia is uneven: approximately 60% of pellet production plants are located in the Northwest regions of the country, about 30% of pellet production is located in the Central regions and the rest 10% are located in other regions of Russia. (Proskurina, Heinimö, Mikkilä, & Vakkilainen, 2015) The figure below (Figure 15) shows the distribution of pellet producers in the year 2011.

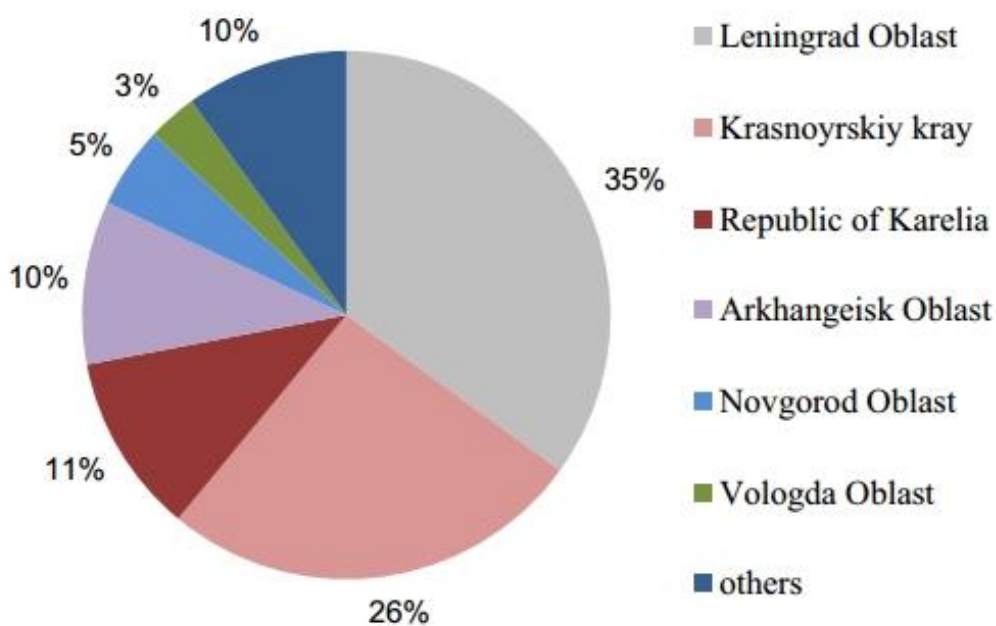


Figure 15. Regional distribution of pellet production in %, 2011 (Proskurina, Heinimö, Mikkilä, & Vakkilainen, 2015)

The top ten pellet production facilities have 92 percent export share of the total Russian wood pellet industry. Domestic demand for wood pellets is forecasted to increase annually by 10-20%. According to the information provided by the Russian Customs Service the exports of wood pellets in 2014 increased by 18% compared to the year 2013. (USDA, 2015)

#### 6.4.2 Export Rates in Russia

In Russia the share of biomass in the energy balance of the country is about 3% – 5% while in Finland it is not less than 25%, in Sweden – at least, 30%. Russian exports are much greater than the actual use of this type of fuel in the country. Demand for wood pellets in Europe is increasing annually by 30%. The market growth may be explained mainly by the entry into force of the Kyoto Protocol, according to which the EU must reduce greenhouse gas emissions. For example, the Swedish government increased the consumption of wood pellets to several million tons per year by 2010. The global market for wood pellets has increased significantly. In 2012, there was a doubling of the market. (Vahromova, 2015)

Ten years ago, pellet production in Russia was done by not more than seven plants. During the period from 2005 to 2015 the amount of wood pellet production companies increased to more than a hundred. (Infobio, 2015)

According to the IAA Infobio, the production and export rates of wood pellets in Russia are increasing, the comparative rates are shown in the figure below (Figure 16). The export rate accounts for approximately 92 – 97% of the total production volume.

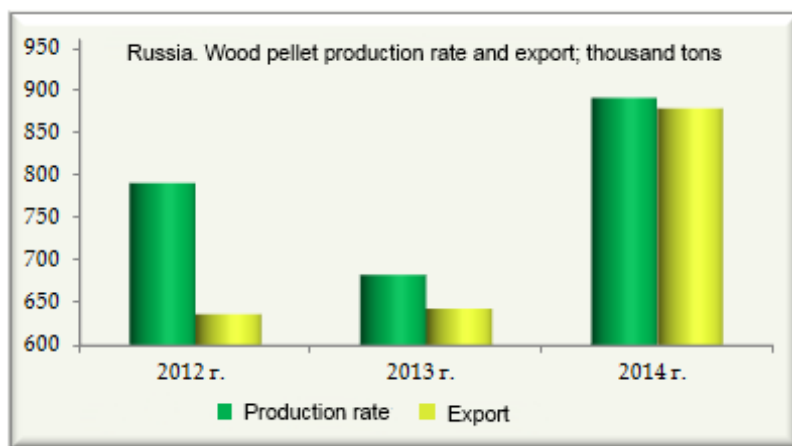


Figure 16. Wood pellet production rate and export in Russia. (Infobio, 2015)

### 6.4.3 Distribution of Wood Pellet Producers in Russia in 2014

The figure below (Figure 17) shows the distribution of pellet producers in the year 2014. The map shows the going concerns as well as the plants which were under construction in 2014.



Figure 17. The pellet production in Russia, 2014. (Rakitova, 2015)

This figure shows that the industry production is growing. According to FAOSTAT forecasts, Russian wood biofuel production level would be increasing. Significant increase up to 4 million tons is predicted for the year 2020, up to 8 million tons by the year 2025. (Dmitrieva, 2015)

### 6.4.4 Number of Market Players

The number of processing facilities in the year 2010 was 145, but the number decreased to 100 in the year 2014. The number of Russian wood pellets facilities is shrinking due to industry consolidation and rapid expansion in larger processes. It is expected that larger businesses will continue absorbing smaller pellet facilities. (USDA, 2015)

Nevertheless, new pellet production facilities appear every year, for example:

1. The ZAO «Lesozavod-25» (belongs to the Group of “Titan” Companies), with annual capacity of 60 thousand tons, launched pellet production in 2009
2. The Pellet Facility in Igirma, Irkutsk Oblast, with annual capacity of 30 thousand tons launched in 2011
3. Swedwood Tikhvin with a capacity of 75 thousand tons of pellets, launched production in 2011 (Proskurina, Vakkilainen, Heinimö, & Mikkilä, 2014)
4. The new, joint Russian-Austrian investment project, “Hasslacherles” in Novgorod Oblast with annual capacity of 20 thousand tons, pellet production launched in 2014
5. The Company RusForest, pellet facility located in Arkhangeslk Oblast with annual capacity of 100 thousand tons (USDA, 2015)
6. Pellet plant opened in Tver Oblast. Penovsky woodworking factory unites two companies: “Invest-Leasing-Tver” (provides raw materials) and “Discovery-Peno” (subsequent processing of wood). Launch of wood pellets production in 2015
7. In the Irkutsk Oblast in 2015, the plant in the Magistralnyj planned capacity of 30 thousand tons per year of wood pellets and pellet plants "Russian Forest Group" will be able to produce up to 110-115 thousand tons per year (Novaya Igirma) and 75-85 thousand tons per year (Ust-Kut) of solid biofuels. Need to mention that the pellet plant in Novaya Igirma (Irkutsk region) was put into operation in early 2015. Pellet production capacity – 30 thousand tons per year. The plant belongs to the company "Lesresurs" and is operated by “Rusforest Management Group”.
8. In Pirovsky District of Krasnoyarsk Krai, the wood company "Krasresurs-24" built the pellet plant on its territory. Pellet production will fully dispose of existing wood waste, as well as profit from the sale of biofuels. Production capacity – 750 kg per hour of pellets
9. “ULK Group” launched a new large investment project for construction of a plant for processing small-diameter wood in Ustyansky District of the Arkhangelsk Oblast. In 2016, the holding company plans to begin construction of a modern sawdust pellet

processing plant with the capacity of 120 thousand tons per year.

The products will be exported.

10. In 2016, three new pellet plants will be built in the Krasnoyarsk Territory. "SIBLES project" capacity of 17 200 tons of wood pellets per year, "Angara Paper" capacity of 100 thousand tons per year of pellets and "Kraslesinvest" capacity of 240 thousand tons per year. (Dmitrieva, 2015)
11. The main goal of Arkhangelsk region is to produce 250 thousand tons of pellets. (Rakitova, 2015)
12. The new company "Russian Wood Pellets" ("RWP") plans to construct several pellet mills with a total capacity of 3 million tons of pellets per year (Proskurina, Heinimö, Mikkilä, & Vakkilainen, 2015)
13. "German Pellets Nizhny Novgorod" ("German Pellets") will open the production of wood pellets for heating in the Bor district of Nizhny Novgorod region in the spring or summer of 2016. Products of "German Pellets Nizhny Novgorod" will be available in European countries. The production capacity will reach 600 thousand tons per year. (RBK, 2014)

This data means that even though small pellet facilities tend to be absorbed by bigger businesses, new plants are being built every year.

The table below (Table 2) contains information about the leading pellet exporters of the year 2013 (10 months).

Company	Export volumes 2013, 10 months; tons	Region
"VLK"	262761	Leningrad Oblast (Sovetsky)
"SP Arkaim"	119228	Khabarovsk Krai
"DOC Enisey"	107977	Krasnoyarsk Krai
"Lesozavod-25"	73981	Arkhangelsk Oblast

"Novoyeniseisky WCC"	57601	Krasnoyarsk Krai
"Russian Wood Alliance"	40660	The Republic of Karelia
"Setново"	38573	Novgorod Oblast
"Swedwood Tikhvin"	38451	Leningrad Oblast (Tikhvin)
"Biolesprom"	34536	Vologda Oblast
"Severo-Zapadny Holding"	34521	Leningrad Oblast (Podporozhje)

Table 2. Leading Russian pellet exporters 2013, 10 months. (Infobio, 2014)

In order to evaluate the leading companies listed above, the data is compared to the list of leading Russian wood pellet producers of the year 2014 (Table 3).

Company	Production capacity; tons	Region
"VLK"	300 000	Leningrad Oblast
"SP Arkaim"	70 000	Khabarovsk Krai
"Lesozavod-25"	63 000	Arkhangelsk Oblast
"Novoyeniseisky WCC"	50 000	Krasnoyarsk Krai
"Mir Gralul"	45 000	Leningrad Oblast
"LDK-3"	45 000	Archangelsk Oblast
"DOC Enisey"	45 000	Krasnoyarsk Krai
"Severo-Zapadny Holding"	40 000	Leningrad Oblast
"Swedwood Tikhvin"	35 000	Leningrad Oblast
"Russian Pellet"	32 000	Mari El republic
"Biogran"	30 000	The Republic of Karelia
"Setново"	25 000	Novgorod Oblast
"STOD"	20 000	Tver Oblast

Table 3. Leading Russian wood pellet producers 2014, annual production capacity. (Dmitrieva, Leading pellet production companies, 2015)

For a clearer picture, the data on leading Russian exporters of wood pellets of the year 2014 is represented in the table below (Table 4).

Company	Export volumes 2014; tons	Region
"VLK"	259652	Leningrad Oblast (Sovetsky)
"Kraslessnab"	61122	Krasnoyarsk Krai
"SM Biomass"	48063	Leningrad Oblast
"LDK-3"	45425	Arkhangelsk Oblast
"Lesozavod-25"	42767	Arkhangelsk Oblast
"Novoyeniseisky WCC"	42519	Krasnoyarsk Krai
"LAN"	30801	
"Setново"	23955	Novgorod Oblast
"Severo-Zapadny Holding"	15772	Leningrad Oblast (Podporozhje)
"Mir Granul"	15536	Leningrad Oblast

Table 4. Leading Russian pellet exporters 2014. (WOOD.RU, 2015)

Analyzing the data superficially, it is possible to see that most of the leaders hold their positions in the market.

The table below (Table 5) shows the data from the report prepared by the staff of USDA Foreign Agricultural Service. The general aim of the report is to assess commodity and trade issues. The information below shows the amount of market players of Russian pellet production industry of the years 2007-2015, including the total capacity used.

Production Capacity									
Calendar Year	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of Plants	65	70	97	145	120	120	103	98	97
Capacity Use (%)	50	55	67	75	75	78	80	80	85

Table 5. The number of Russian pellet plants and overall capacity usage (%), 2007-2015. (USDA, 2015)

At the same time, according to the data of Information and Analytical Agency "Infobio" in the second half of the year 2015, the total of 157 companies was exporting pellets from Russia. The difference between the two rates of the year 2015 can be explained by the fact that the wood pellet market is changing rapidly. At the same time, not all Russian companies share and publish its data on trade and exports. The two facts might cause the statistical difference of 60 companies.

From the point of view of IAA "Infobio" the leading companies of the 157 are:

1. "VLK" (Leningrad Oblast)
2. "Lesozavod-25" (Archangelsk Oblast)
3. "SP Arkaim" (Khabarovsk Krai)
4. "DOC Enisey" (Krasnoyarsk Krai)
5. "LDK-3" (Archangelsk Oblast)
6. "Novoyeniseisky Wood-Chemical Complex" (Krasnoyarsk Krai)
7. "Setново" (Novgorod Oblast)
8. "Lesresurs" (Irkutsk Oblast). (Infobio, 2016)

Unfortunately, full and complete database of pellet producers in Russia is not available free of charge. It is possible to purchase it for example, from the web-site of IAA Infobio. The database of the pellet producers in Russia, Ukraine, and Belorussia includes a list of over 400 pellet producers in 3 countries with plant capacities, production volumes, machinery types and names, pellet prices, sales conditions, coordinates (tel., e-mail, address and etc.) and other information. (Infobio, 2015)

The English version of the database contains the information of the interval 2008-2015. The Russian version of the database has the information of the interval 2008-2016 and costs 75% more than the English variant.

Among other big facilities used for the survey are:

1. "Biogran" (The Republic of Karelia)
2. "Biotop" (Pskov Oblast)
3. "DOTS" (Bryansk Oblast)
4. "Biolesprom" (Vologda Oblast)
5. "Mir Granul" (Leningrad Oblast)
6. "Penovskaya Derevoobrabativayuschaya Fabrika" (Tver Oblast)
7. "Russian Pellet" (Mari El republic)
8. "Russian Wood Alliance" (The Republic of Karelia)



9. "Setles" (The Republic of Karelia)
10. "Severo-Zapadny Holding" (Leningrad Oblast)
11. "STOD" (Tver Oblast)
12. "Swedwood Tikhvin" (Leningrad Oblast)
13. "Talion Terra" (Tver Oblast).

According to all the gathered information, the list of wood pellet production companies includes 21 positions. 12 companies on the list are located in North and North-West of the country, 4 companies are situated in the Central Russia and all the rest are in Siberia and the Russian Far East. The first 8 companies of the list are the leaders of the Russian wood pellet market of the second half of the year 2015 according to the information of IAA "Infobio".

Name	Group	Location	Production capacity; thousand tons/year	Scale	Country of origin	Export share of the total production capacity
VLK		Leningrad Oblast	1 000	Big	Russia	
Lesozavod-25	Titan	Archangelsk Oblast	94	Big	Russia	95%
SP Arkaim		Khabarovsk Krai	240	Big	Russia	
DOC Enisey		Krasnoyarsk Krai	80	Big	Russia	
LDK-3	Titan	Archangelsk Oblast	67	Big	Sweden Russia	
Novoyeniseisky Wood Chemical Complex		Krasnoyarsk Krai	50	Big	Russia	
Setново	Stora Enso	Novgorod Oblast	35	Big	Finland Russia	
Lesresurs		Irkutsk Oblast	30	Big	Russia	
Mir Granul		Leningrad Oblast	50	Big	Russia Estonia	100%
Severo-Zapadny Hodling		Leningrad Oblast	50	Big	Russia	
Swedwood Tikhvin	IKEA	Leningrad Oblast	55	Big	Sweden Russia	85%
STOD	STOD	Tver Oblast	20	Medium	Russia	
Russian Pellet		Mary republic	32	Big	Russia	

Talion Terra	STOD	Tver Oblast	60	Big	Russia	
Setles	Stora Enso	Republic of Karelia	30	Big	Finland Russia	
Biotop	GS Group	Pskov Oblast	90	Big	Russia	
Biogran	Russian Wood Alliance	Republic of Karelia	40	Big	Russia	
Lespromsever		Vologda Oblast	30	Big	Russia	
Russian Wood Alliance	Russian Wood Alliance	Republic of Karelia	15	Medium	Russia	
DOTS		Bryansk Oblast	60	Big	Russia	
Discovery Peno Invest-Leasing-Tver	Penovskaya derevo obrabotivayushchaya fabrika	Tver Oblast	18	Medium	Russia	

Table 6. Leaders of Russian wood pellet market applied for the survey.

It is hard to evaluate the export rates and positions of the companies in the market as far as the rates change very often. Company size measure was applied according to the scaling method of the final report "The Pellet Market and Wood Resources in the North-West of Russia" prepared by Dr. Olga Rakitova and Dr. Vladimir Kholodkov. According to the report, there are three size types: large-size producers (Big), mid-size producers (Medium) and small-scale producers. (Rakitova & Kholodkov, 2009) In MHG Systems' case, the small-scale type is not applied as far as only the leading companies are taken into account.

In the large-size segment, factories with the production capacity of minimum 27,5 thousand tons of pellets per year are included in this research. Such market players have financial power which allows them survive during crises and make long-term agreements and contracts of export. The mid-size producers segment refers to companies that produce from 12 thousand up to 24 thousand tons of wood pellets per year. Companies which belong to this segment may survive on the domestic market and on the export market if the marketing situation is good. Pellet production investments of these companies are not very big, hence, these companies are more flexible. (Rakitova & Kholodkov, 2009)

## 6.5 Survey of Wood Pellet Producers

Most companies of the Russian market prefer to keep information confidential. On this ground, less than half of the companies on the list agreed to share the information regarding ERP-systems usage. Two companies totally refused to share the information, five companies refused to talk but asked to send a form. Unfortunately, none of the five companies responded. On the whole, only nine companies were open for communication and information sharing.

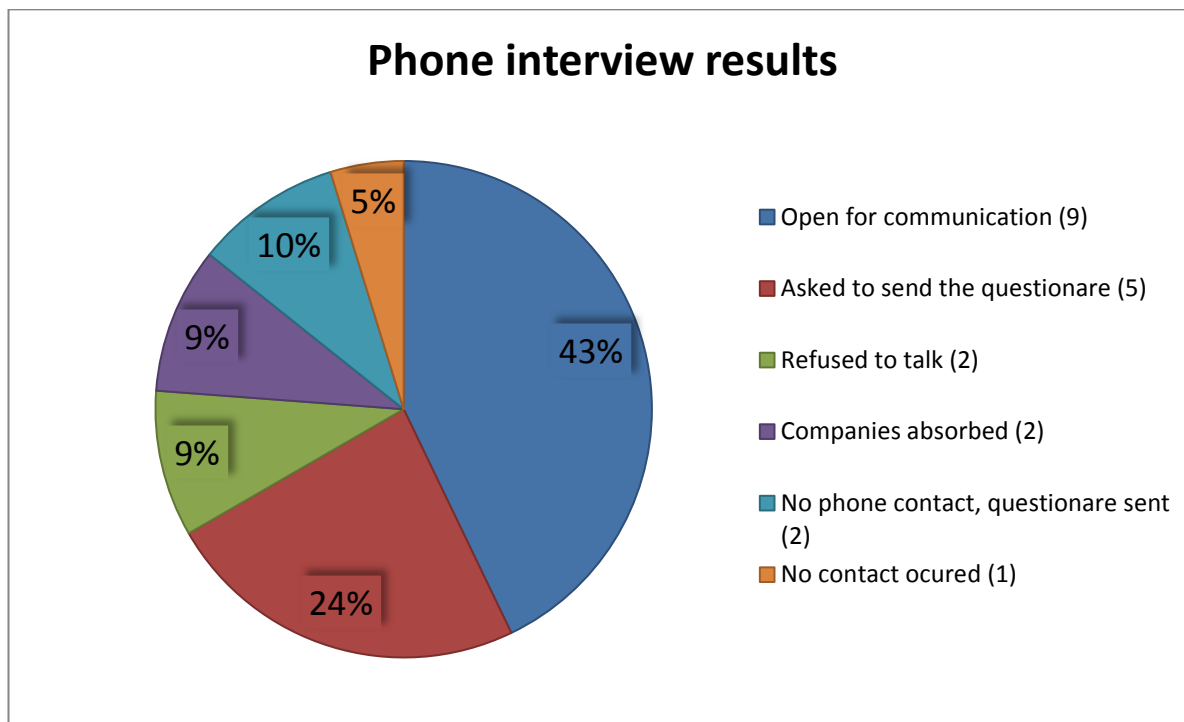


Figure 18. Results of the survey. Russian market wood pellet production companies.

## 6.6 Survey Results

According to the information shared by the companies, wood pellet manufacturers of the Russian market are either using ERP-products of the company 1C or are not using any ERP-solutions. Among the products of the company 1C the following are used:

1. 1C: Accounting
2. 1C: Manufacturing Enterprise Management
3. 1C: ERP.

The main factors which influence the choice of an ERP-system are shown in the figure below (Figure 19). The price of an ERP-system plays a very important role for most of

the companies interviewed. Among other criteria, broad functionality and operational efficiency were named very often.

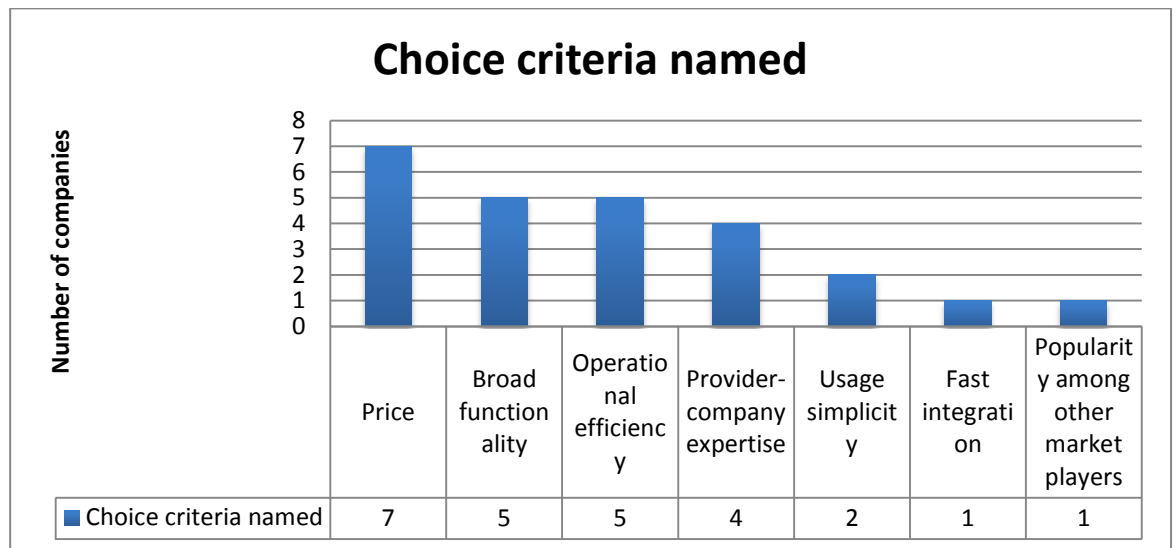


Figure 19. Named criteria which influence the choice of an ERP-system (one company could name several choice criteria).

At the same time, the preference order of the criteria value is the following:

1. Broad functionality (most often named first)
2. Price (most often named second)
3. Provider-company expertise (most often named third)
4. Operational efficiency
5. Usage simplicity
6. Fast integration (named once)
7. Popularity among other market players (named once).

The figure below (Figure 20) shows the ERP operational modules which may be applied in the companies dealing with Biofuel production. The numbers in the chart stand for the number of companies which named the module.

## ERP modules applicable in the production

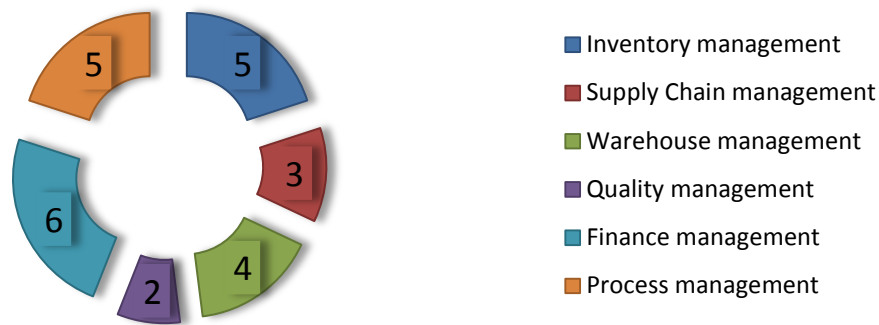


Figure 20. ERP modules applicable for Biofuel production from the point of view of the interviewed companies (one company could name several modules).

The list of needs (lack of options) in the ERP-systems used nowadays by the Russian wood pellet producers is the following:

1. Real-time control of the processes and access to the latest data (none of the companies have the real-time control of the processes, resources and storages)
2. Fast deployment (the deployment of the existing on the Russian market ERP-solutions may last for months and even years)
3. Wide range of functional modules (due to the fact that the ERP-systems presented in the Russian market are not specialized for Biofuel production, there is a lack of lots of control options)
4. Usage simplicity (the systems used have a very complicated interface, some of the functions are incomprehensible to the staff)
5. Usage training and consulting (due to the complication of the system the staff requires a lot of training and consulting)
6. Completeness of the system (as mentioned above, the systems are incomplete and require much time to be deployed and adapted for the company needs).

### 6.7 Value of an ERP-system in a Biofuel Production Company

The value of an ERP-system in the Biofuel production branch is critically high. The need for the use of tools which allow a company to increase the efficiency of business processes grows in accordance with the Biofuel industry rapid development. The industry development proceeds at a rapid pace and grows fast, hence the necessity of special tools used for optimization of processes, optimization of resources usage and financial efficiency optimization. Moreover, the companies are aiming to increase the

level of Environmental Friendliness of all the production processes and try to decrease the amount of CO<sup>2</sup> emissions. Achievement of this goal definitely requires the total control of all the processes of a company on a real-time basis.

## 6.8 Segmentation

The reasons why segmentation is not applicable for this case are the following: Russian wood pellet market is rapidly developing, big corporations absorb small facilities, and the rates are increasing yearly. At the same time, the industry is relatively new and faces changes constantly. Especially, for this reason, it is very hard to apply segmentation to the industry market players. Company size (production rate) changes yearly, medium-size producers either grow rapidly or are absorbed, so the size segmentation is hard to implement. Most original location of most companies is in Russia and even in case the ownership is shared by Russia and any European country – this is insignificant and does not influence the overall situation. Most of the companies use ERP-solutions but are not very satisfied with it and are open to new and simple alternative or additional ERP-tools. And the choice criteria are the golden mean between functionality, quality, and price.

## 6.9 Strategy of Market Coverage

The product of MHG Systems Oy is intended exactly for the companies of forestry and biofuel industry sectors. According to the survey, most companies feel the need of ERP-system adapted exactly for their industry as far as the forestry and biofuel production specifics require certain record systems, a wide range of specific functions available and real-time access to the data.

Six companies out of the nine which agreed to share information regarding ERP-systems took the initiative and asked to share the information regarding the product of MHG Systems Oy. This fact indicates that even though some companies use ERP-systems, the existing solutions do not meet all the needs. The ERP-solutions at the Russian market are not finished products and require revision. Moreover, the systems are complicated hence it takes long a time for the users to familiarize with the functionality and usage methods. In addition to that, the implementation period of the existing ERP-solutions of the Russian market is significantly long and it takes much time to adapt the system to the required industry.

Due to the facts mentioned above, the Undifferentiated Marketing strategy should be applied to promote the MHG Biomass Manager in the Russian market. The reasons are:

1. No existing ERP-solution specialized for the Biofuel production industry
2. Ready-to-use wide range of functional modules (low deployment time compared to all the existing products of competitors)
3. Provides the real-time control of the processes and storage (required for most of the interviewed companies)
4. Small amount of large-size and mid-size producers of wood pellets
5. Segmentation is not applicable.

#### 6.10 Competitor Analysis

Due to the weakening of the national currency, investment budgets have been significantly curtailed in many companies for the year 2015. A number of contracts were terminated as well. Also, the increase in the exchange rate of foreign currencies led to a rise in the cost of licenses to the foreign ERP-systems. As a result, large-scale projects for the introduction of foreign ERP-systems to end users have become more expensive. (TAdvicer, 2015) Nevertheless, the situation for MHG Systems Oy is different. Due to the fact that most wood pellet production goes for export at the price stated in Euro currency, the wood pellet manufacturers faced significant price and income increase during the past two years regarding the export of wood pellets.

Another advantage of MHG Systems' service relates to very short integration period. In order to save money and obtain economic benefits companies prefer the ERP-solution projects with short integration period and fast implementation of all the functions available. (TAdvicer, 2015) Russian ERP-solutions are inferior to the foreign solutions not only in functionality but also in methods of integration.

According to the statistical data of the analytical agency "TAdvicer", during the period of 2005 – 2015, the top five leaders of the ERP-solutions market are the companies listed in the figure below (Figure 22). The evaluation was processed according to the amount of complete system integration projects.

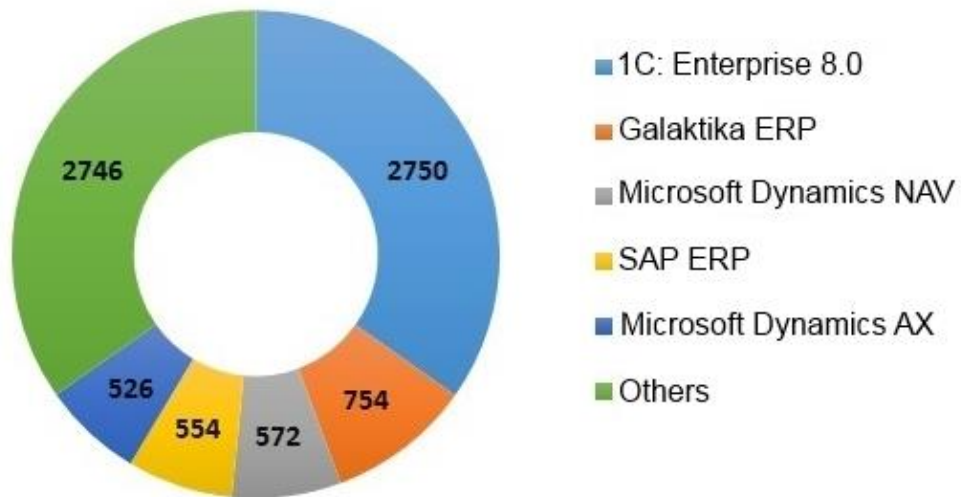


Figure 21. Most frequently integrated ERP-platforms in Russia; 2005-2015. (TAdvicer, 2015)

The list of vendors of ERP-systems listed by the number of integration projects in Forestry and Woodworking industry in Russia is presented in the table below (Table7) according to AA "TAdvicer". The list of ERP-systems according to the number of integrations in the Forestry and Woodworking Industry in Russia (2005-2015) may be found from the Appendix 2.

Vendor	Number of products	Number of projects in the industry	Number of partners' systems on the base of vendor's products	Number of partners' projects on the base of vendor's products
1C	4	52	351	14
Galaktika Corporation	4	25	13	3
Microsoft	3	16	166	1
Infor	3	11	1	0
SAP SE	2	7	32	0
Epicor Software Corporation	1	3	1	0
IBM	1	2	1	0



Compas	1	2	12	0
Intellect-Service	1	2	0	0
North-West Neosystems	1	1	0	0
Monolit-Info	1	1	0	0
Exact Software	1	1	0	0
Infosoft	1	1	0	0
Click Systems	1	1	7	0

Table 7. ERP-systems vendors for Forestry and Woodworking industry in Russia; 2005-2015. (TAdvicer, 2015)

None of the companies produces ERP-systems specialized for Bioenergy Industry. This fact means that MHG Systems Oy has a great advantage as far as its ERP-system is specialized exactly for the Forestry and Bioenergy Industry control and management.

According to the data gathered from various on-line information sources and phone contacts to the companies of the potential customer list, the two main competitors of MHG Systems Oy are 1C and SAP SE. The competitor profiles may be found from Appendices 3 and 4. The two companies are the leaders of the ERP-systems market; their products are well-known and widely used in all business fields. Nevertheless, the systems offered by these companies are complicated and require much time for integration and deployment. Moreover, MHG Systems ERP-solution is designed specially for forestry and biofuel production industries hence, the range of ERP-modules and options meet the requirements and demands of the forestry and biofuel market players much more widely, in comparison with the products offered by the competitor companies.

## 7 CONCLUSION

### 7.1 Situation at the Moment

Nowadays the wood pellet production industry is developing rapidly in Russia. Every year tens of new companies are opened in different regions of the country, existing wood pellet market players are increasing the production capacity volumes and grow territorially by absorbing the smaller facilities. ERP-tools are highly required in the Russian market in order to increase operational efficiency and sustainability of the companies and develop business processes.

More than 100 companies in Russia are producing wood pellets; most of the facilities are located in the Northwest regions and Central Russia. The number of wood-pellet facilities is non-stable and changes yearly: new plants are built every year, small facilities are being absorbed by bigger businesses. Nevertheless, the industry is constantly developing.

Most of the companies do use ERP-solutions for the management of their businesses, but the ERP-systems of the Russian market are not complete products and require modification and revision. Deployment and integration of a system may last for months and even years. In addition to that, the systems' interfaces are complicated, the range of functional modules is limited and not specified for Forestry and Biofuel production facilities. Lack of real-time control of operations and inventory sophisticates the business and decreases the level of efficiency.

ERP-solutions offered at the Russian ERP market are not specialized for certain industry branches and are produced incomplete, that is why after a company purchases the system it takes much time to adapt it to the company's business. Most of the ERP-solutions do not provide real-time control.

### 7.2 Result Analysis

The top 15 – 20 wood pellet producers of Russian market have over 95% of export share. This number includes companies of large-size and medium-size segments. Due to the rapid development of the market and lack of up-to-date data, it is hard to define exact positions of the facilities in the market. Nevertheless, the leaders tend to hold their positions while increasing production capacities.

Increasing production capacity rates, competition, aiming to increase the level of environmental friendliness and rapid development of the industry forced the companies to use ERP-solutions. The ERP-tools offered at the Russian market do not meet the needs of companies of the wood pellet production industry. Slow deployment and long duration of integration, limited range of functional modules, complicated interface, and no real-time control – are the main problems of the ERP-solutions used by the wood pellet producers nowadays. The companies are seeking for the easy-to-use tool which would allow them to control inventory, supply chain and manufacturing processes remotely on a real-time basis, make environmental-friendly business and increase the efficiency. MHG Systems Oy has made a system which is able to solve all these problems.

Due to the fact that the top 15 – 20 wood pellet facilities in Russia have over 95% export share and the fact that big and medium size corporations absorb small facilities, it is clear that the number of potential customers in the industry is not very big. Segmentation is not applicable in this case. Most of the segmentation variables among the companies match. The average export rate of all the companies accounts for 92 – 97% of the total Russian wood pellet production rate which means that the export rate of every company accounts for 80 – 100% of total the rate of production. These companies' ERP-system choice criteria are very similar. According to the needs and the value of an ERP system for the companies, the undifferentiated market strategy should be applied.

The two main competitors of MHG Systems Oy, defined along the survey hold over 80% of the Russian market of ERP-solutions but their ERP-products do not meet the needs of wood pellet producers completely. For this reason, MHG Systems Oy does not face straight competition in the Russian market of ERP-solutions due to the cut and deep expertise specialization field. Nevertheless, the competitor products are used widely in all industries and are being developed. These facts show that the introduction of MHG Systems' ERP-solutions to the Russian market is manageable and demanded, but requires time, patience and perseverance.

## 8 SUMMARY

I consider this study to be a successful research. I managed to reach the goals: study the Russian wood pellet market, define the needs of market players regarding ERP-solutions, define the value of an ERP-system for Biofuel production industry, evaluate the level of competition and define appropriate market integration strategy. Furthermore, while doing the survey I familiarized myself with wood pellet production process phases and technologies, studied the Russian wood pellet production market and its leading players, had an opportunity to study deeper the topic of market analyzing and its tools and methods, which helped me to analyze the current market situation of Russian wood pellet industry and its needs.

This research is meant to be useful tool for MHG Systems Oy and would help the company to promote the MHG Biomass Manager in the Russian ERP market for the following reasons:

1. Industry analysis
2. Well-defined needs of the target market players
3. Analysis of competitors' products' strengths and weaknesses
4. Definition of market coverage strategy.

Summarizing all the above, the main objectives of the thesis were attained – MHG Systems Oy has now information about the main wood pellet industry players of Russia, knows the current situation in the Russian market of ERP-solutions specialized for the Biofuel production and it can now proceed with the MHG Biomass Manager integration to the Russian market.

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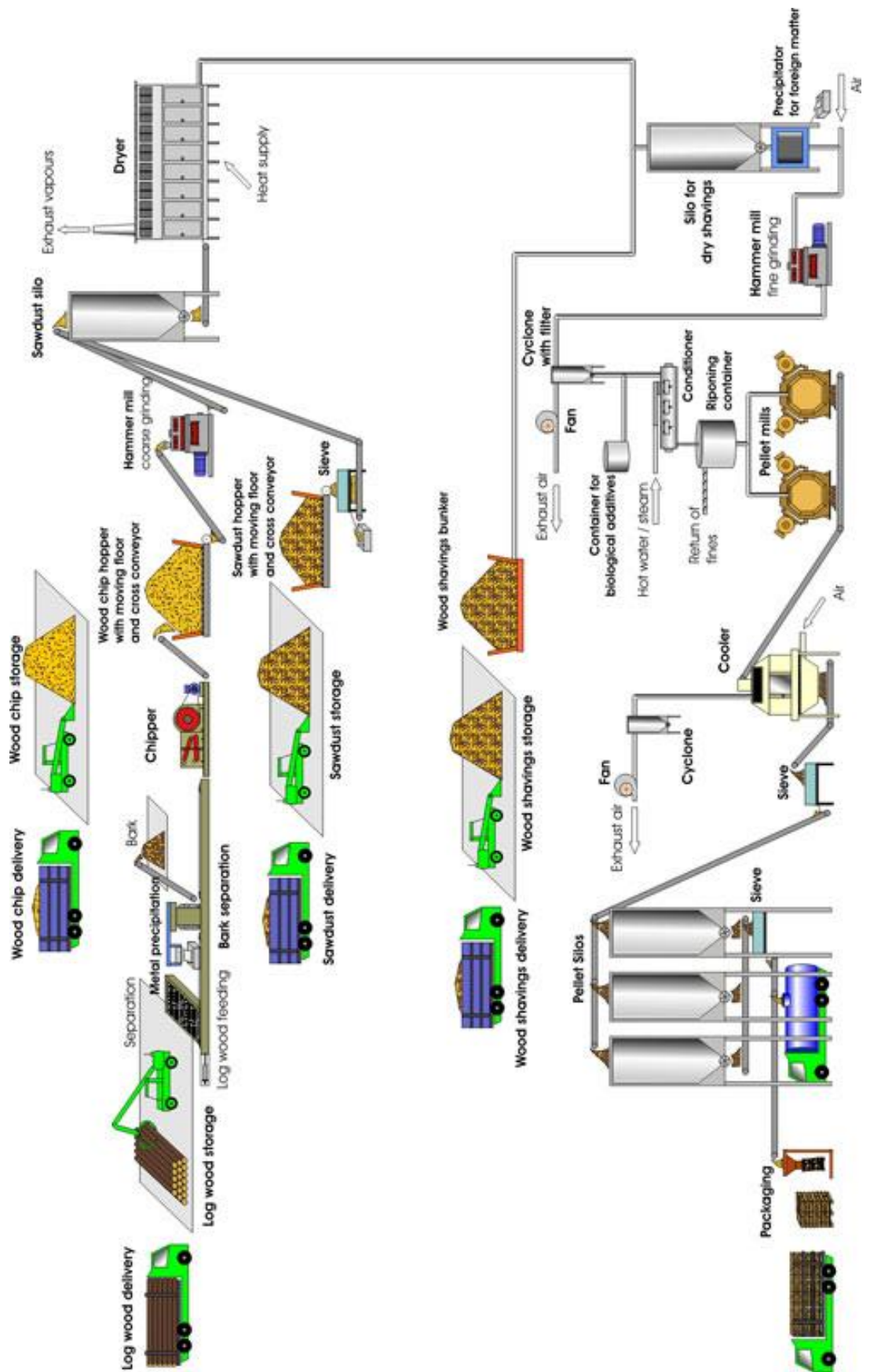
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# APPENDIX 1: Pelletizing Process (BIOS Bioenergiesysteme GmbH)





APPENDIX 2. List of ERP-systems according to the number of integrations in the forestry and woodworking industry in Russia, 2005-2015. (TAdvicer, 2015)

Product	Vendor	Number of integrators	Number of Projects	Number of Projects on product base
1C: Enterprise 8.0	1C	29	39	11
Galaktika ERP	Galaktika Corporation	7	19	3
1C: Enterprise 8.2	1C	4	11	3
Microsoft Dynamics NAV	Microsoft	3	8	1
Microsoft Dynamics AX	Microsoft	2	7	0
SAP ERP	SAP SE	5	6	0
Infor ERP SyteLine	Infor	1	5	0
Infor:COM	Infor	1	4	0
Epicor iScala	Epicor Software Corporation	1	3	0
Galaktika. Manufacturing Enterprise Management	Galaktika Corporation	2	3	0
IBM Cognos TM1	IBM	2	2	0
Baan	Infor	1	2	0
IS-PRO	Intellect-Service	2	2	0
ERP-system "Compas"	Compas	1	2	0
Galaktika Progress	Galaktika Corporation	2	2	0
1C: Enterprise 8.3	1C	1	1	0
1C: Enterprise 8. Construction Enterprise Management	1C	1	1	0
Exact Globe Enterprise	Exact Software	1	1	0

Microsoft Dynamics NAV 2009	Microsoft	1	1	0
SAP Business One	SAP SE	1	1	0
KIS "Flagman"	Infsoft	1	1	0
Galaktika Express	Galaktika Corporation	1	1	0
ERP Monolit	Monolit-Info	1	1	0
1C: Enterprise. Sawmill	North-West Neosystems	1	1	0
Client-Communicator (Ckick)	Click Systems	1	1	0

### APPENDIX 3. Competitor Profile. "1C"

Company	1C
Competitor profile	
Overview	The company specializes in development and distribution of mass-market software (education and entertainment software, business software). Most known ERP-solutions are: "1C: Accounting" and "1C: Enterprise". Sales rates: Business software – 40% of income, Games, and software of side vendors – 30% of income.
Competitive advantage	More than 1 million companies are using 1C: Enterprise. The company is very well-known, largest software producer in Russia. Country of origin is Russia.
Marketing profile	
Target market	All business spheres
Market share	30,5% (2013)
Marketing strategies	Partnership, franchising
Product/Service profile	
Product/Service offerings	"1C: Salary and Personnel Management 8"; "1C: Trade Management 8"; "1C: Retail 8"; "1C: Holding Management 8"; "1C: ERP Enterprise Management 2.0"; "1C: Enterprise 8. Manufacturing Enterprise Management"; "1C: Integrated Automation 8"; "1C: Document 8, and TRAC version CORP"; "1C: Consolidation 8"; "1C: Managing a small firm 8"; "1C: Taxpayer 8"; "1C: Reporting entrepreneur 8"; "1C: Payment documents 8"; "1C: Accounting of public institutions 8"; "1C: Salary and Personnel budget entity 8"; "1C: Reporting Code 8"; "1C: Budget Reporting 8"; "1C: Document state institutions 8"; "1C: State and local government purchases 8"; "1C settlement Budget 8"; "1C: The budget of the municipality 8"; "1C: Money 8"; "1C: E-learning".
Pricing and costs	The price varies from 1500 rubles up to 1 million rubles depending on the product. The price list may be downloaded from the company's web-site.
Channels	"1C" is built as a network of dealers: the headquarters (state – no more than 1 thousand people.) is developing the basic IT-platform and standard business solutions. Partners

	develop it to the final products and sell to customers partners. Network "1C" has more than 10 thousand partners, including 6,700 franchises in 600 cities in 23 countries. (Rusyaeva, 2015)
SWOT profile	
Strengths	Wide range of products offered, wide partner network, low prices
Weaknesses	The ERP-solutions are not finished products, slow deployment
Opportunities	Lots of customers in different business spheres
Threats	Low level of customer satisfaction in the Biofuel production sector

APPENDIX 4. Competitor Profile. "SAP SE"

Company	"SAP SE"
Competitor profile	
Overview	The world leader in enterprise applications in terms of software and software-related service revenue. Based on market capitalization, the company is the world's third largest independent software manufacturer.
Competitive advantage	Largest software manufacturer in the Russian market
Marketing profile	
Target market	All business spheres
Market share	49,9% (2013)
Marketing strategies	Partnership
Product/Service profile	
Product/Service offerings	Asset Management; Commerce; Finance; Personnel Management; Production; Marketing; Research / Design; Sales; Service; Sourcing and procurement; Supply chain; Sustainable development
Pricing and costs	-
Channels	The main sources of SAP business growth in Russia are innovative technologies: mobile technologies, mobility, cloud and high-speed calculation (HANA). Moreover, expanding the company's presence in the CIS countries, business development in strategic sectors (banks, public sector), the development and deepening of relations with the largest companies in the region, a significant expansion of work with the fast-growing business. (TAdvicer, 2015)
SWOT profile	
Strengths	Wide range of products, Leading ERP-producer
Weaknesses	High prices
Opportunities	Lots of customers in different business spheres
Threats	Low level of customer satisfaction in the Biofuel production sector



