

INCREASING THE VALUE ADDED OF FORESTRY PRODUCTION IN LATVIA ON THE BASIS OF VERTICAL INTEGRATION OF ENTERPRISES

Alexander Stetjuha, Karina Vlasova
Transport and Telecommunication Institute, Riga, Latvia

Abstract

The goal of the presented paper is to investigate the possibilities of increasing the value added of the Forestry industry product on the basis of enterprises vertical integration. Vertical integration implies integration of all consecutive productive processes, providing the production of all components, participating in producing the final product, into one enterprise. This integration is possible both on the basis of merging two or more companies, engaged in producing the respective components of one-type product and on the basis of expanding the structure of technological processes providing in aggregate the final product output at operating enterprises. Vertical integration of both types is possible for implementation at Forestry industry in Latvia. The potential solution for the first type can be merging the forests proprietors and processing enterprises; the integration of the second type presupposes investing funds or attracting investments for developing the processing technologies providing the higher level of value added timber processing. The paper considers the investigation of economic results of organisational and engineering and technological transformations oriented on the development of vertical integration of industry companies providing the increase of high value added production within the Forestry industry.

Key words: forestry industry, value added, vertical integration, product structure.

JEL: L68, Q23.

Introduction

Forestry is one of the most promising sectors of Latvian economy. Country forest resources serve as a natural prerequisite for this. Latvia is one of the richest in forests countries in the EU. Forests cover 56% of the country; it is 1.7 times more than the average indicator in the world and 1.4 times more than the EU average value. A significant advantage of Latvian forests is their good condition compared to the world average indicator of the forest quality. Moreover, the forest areas of the country are expanding due to the renewable plantations increase. Thus in 2011 there were restored the forest plantations at the area of 35 200 ha; 49.9% of this area is public forests and 50.1% is private forests. In general in 2011 there was restored by 3 025 hectares of forests more than in the previous year (2010). The area of the forest land has almost doubled for last seventy years, while the stock of standing timber has increased by 3.6 times; its amount nowadays is 631 million cubic meters.

The forests have not only great economic significance; they also present great ecological value, affecting all components of the biosphere and playing a huge role in a life of humanity. Therefore, there are forests with different protection modes in all European countries. Estonia takes the first place among the Baltic countries in the share of protected forests, it is almost 30% of all forests; 19.5% of Latvian forests are under protection; in Lithuania this amount is 18.7%. However, considering the European countries even Estonia ranks only the 10th place, since the countries of

Central Europe, being not rich in forests, have no intention to generate income on this industry. The share of protected forests is substantially low in the countries with well-developed forestry activities; for example, in Sweden this amount is only 12.3%, and in Finland it is 7.2%.

The significant experience in forestry and wood processing industry, accumulated by Latvia during many decades of these activities, is the second prerequisite for developing this sector of national economy. It means employment of traditions, people and companies operating in the industry, as well as their knowledge and special technologies.

Economic importance of the forest industry is mostly determined by its contribution to GDP. It takes 3.5% of GDP in Latvia; the forestry contribution to the global economy is 6% of the world GDP. Forestry and timber processing industry has become one of the main sectors of the national economy since Latvia gained its independence in 1991. Currently the sector share in total value added generated by producing industries is more than 26%.

Timber processing industry mostly focused on production of export product, it is one of the most important components of the export potential of the country. One of the sector long-term objectives is turning the forestry, which is still based on the traditions, into a modern state-of-the-art industry.

The goal of this paper is to investigate the possibilities of increasing the value added within the forest industry product on the basis of vertical integration of the enterprises.

There is recently appeared tendency of

implementing the important reforms aimed at stimulating deep processing of wood raw material. Creating the enterprises of forestry, functioning on the basis of the highest world standards and employing contemporary state-of-the-art innovative and environmentally friendly technologies and aimed at efficient use of resources will allow Latvia strengthening its positions in the global market. Development of forestry and timber processing industry has great importance not only for the private business, but also for the economic and social welfare of the entire national economy.

1. Economic Integration within the Forestry and Timber Production Enterprises

According to the definition, integration is a notion belonging to the system theory, meaning the state of connectedness of differentiated individual parts into a whole unit, as well as a process leading to this state [5].

Forestry is often considered as an enlarged unit consisting of three major independent branches: logging, timber processing and pulp and paper. However, while representing the successive stages of the production process, enterprises operating in these industries have the necessary prerequisites for implementing the various forms of integration.

There are three principal forms of integration: vertical, horizontal and conglomerate one; this paper considers the first one only. By V. Vityabsky's definition [7] the vertical integration is merging of two or more companies producing the components necessary for generating the same type of the product. All the production processes are merged successively within one company. The goal of the companies in this merging in a vertical structure is to reduce the transaction costs connected with the acquisition of the necessary resources.

Nevertheless, the more extended notion of vertical integration, also known as associated vertical diversification, seems to be quite reasonable. It is a process of acquisition or incorporation of new production facilities, which are included into the technological chain of manufacturing the same product at the following or previous steps. The concept of vertical integration is the process when businesses prefer to create goods and services necessary for the production procedure within the company instead of buying them on the market from other companies. The integration strategy is justified when the company can improve its profitability by controlling various strategically important links in the chain of production and product distribution.

According to the official data [6], the rate of profitability for different sectors of Russian forestry and timber processing industry presents relations:

- forestry - 15%

- timber processing - 18%
- furniture - 19%
- pulp and paper - 22%

These data reflect the natural tendency: each successive stage of manufacturing has a higher level of profitability. There is simultaneously a higher level of market concentration of economic entities involved in each subsequent stage of the technological chain. Consequently these enterprises gain the greater market power, manifested through the occurrence of the monopolistic effects.

Imposing a particular pricing to the stages below the principal one can be another effect of this integration. For instance, the timber processing company can refuse buying wood at the price stated by logger. Semi-criminal mechanisms of pressure are not excluded from the scheme.

It is important to note that such phenomena are more evident in situations when the business activities are restricted by one-region boundaries (i.e. implementation of the products at the entire chain takes place in the same region). The potential product seller has no alternative in such cases. Buyer can refuse buying the services of this company and switch to another enterprise, especially taking into consideration the fact that they are quite numerous at the initial stage of the production chain.

As a result the part of the logging companies is forced to sell products at prices below the cost. If it happens, the companies mostly manage to cover the costs due to the export sales. Accordingly the situation of selling the product at a price at an almost loss occurs in case of direct contacts between the economic entities; this fact evidences about significant dependence of the enterprises on other businesses.

The vertical integration results in joining the companies at different stages of the production process. The following types of vertical integration, determined by completeness, are possible [7]:

- full integration of production activities;
- partial integration means that certain share of product is manufactured at the plant, while another share is purchased from other companies;
- quasi-integration is creation of alliances among the companies interested in integration without change of ownership.

In accordance with direction of vertical integration it is possible to distinguish two principal forms determined by the position of enterprises in the production chain:

- the "back" integration or so-called backward integration;
- the forward integration

The process of backward integration means that

the company joins the functions previously performed by suppliers, i.e. acquires or takes the control of sources of raw materials, manufacture of components, semi-finished products. The purpose of this integration can be either protection of strategically important source of raw materials or access to new technology, important for primary operations. The process of direct integration presupposes that the company joins the functions previously performed by the enterprises at the following subsequent stages of the production process. There is also widespread practice to join the functions performed by distributors. On this purpose the companies purchase transportation and service facilities, marketing channels and other functional services associated with the main activity of the company. In such cases, the goal of controlling is the product distribution or a need to know better the direct consumers may be pursued.

The various forms of vertical integration are possible in forestry. Moreover, it is possible both due to mobilisation of internal factors and due to outsourcing.

2. State of Production Integration in Timber Processing Complex of Latvia

The paper presents an analysis of 125 leading companies of the timber processing complex in Latvia. The described companies position themselves as export-oriented enterprises; and they actually are. Only five companies of all considered in this paper did not have export sales in 2011-2012. The share of export sales of the largest enterprises even exceeds their share of the total industry sales.

In general, the considered industry does not demonstrate the significantly high level of concentration. The Herfindahl-Hirschman index, calculated as the sum of squares of all participants' shares [4] is $HHI = 0.0458$.

$$HHI = \sum_{i=1}^n \left(\frac{q_i}{Q} \right)^2 = \sum_{i=1}^n \delta_i^2 \quad (1)$$

where

- q_i is the company sales volume;
- Q is the volume of market sales;
- δ_i is the market share of the i^{th} firm

Nevertheless, as it is seen by the nature of the concentration curve (Fig. 1), about twenty largest enterprises implement more than 80% of total sales. Thus, the share of 19 enterprises demonstrated in the graph takes 80.5% of total sales and 80.9% of export sales; the enterprises are shown in the graph in descending order from the origin of the system.

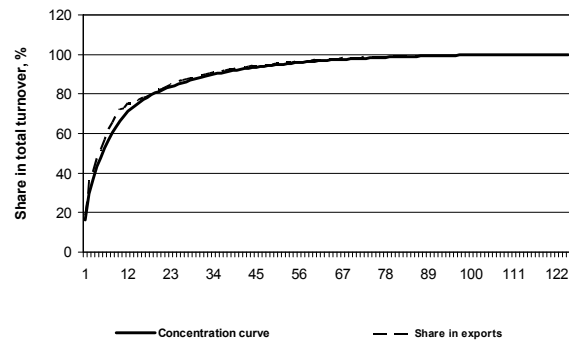


Fig. 1. Concentration curve of considered enterprises and their share in exports

The concentration index CR_r shows the share of the largest firms in total sales r , its values also support the idea of considerable unevenness in output volume of different companies:

$$CR_r = \sum_{i=1}^r \frac{q_i}{Q} = \sum_{i=1}^r \delta_i \quad (2)$$

Considering the industry aggregate, covered in this paper, this index takes values as follows: $CR_4=0.431$; $CR_{10}=0.664$; $CR_{20}=0.813$. Thereby, as it is shown in the chart (Fig. 1), each of these positions (4 enterprises, 10 enterprises and 20 enterprises) has the cumulative share of export exceeding the cumulative sales volume. This indicates that the large companies have more significant share of export sales in comparison with small businesses.

All products and services produced at all principal technological stages of timber processing complex are considered as a constituent part of the product of the companies discussed in this article. They comprise the following technological sequence: forest services and works; primary processing, secondary processing, furniture and furniture parts, and firewood. There are goods and services at each of these stages which can be considered as specific ones for Latvian forestry and timber production industries. They are combined into eleven aggregate groups shown in Table 1. The table demonstrates that in total the industry enterprises produce 70 groups of products and services.

The majority of companies under consideration (44.7%) are specialized in only one stage of the technological chain. Respectively 22.0% and 18.7% of the enterprises have two and three stages of chain in their production. 10.6% of the companies have four production stages in their programme and only five companies (4.1%) have full cycle or five process stages in their production. The

investigation of economic and financial results of enterprises in terms of five groups selected in this way allows identifying the impact of vertical integration on the economic performance of enterprises.

Another aspect of investigating these companies is their consideration in the context of their grouping according to their participation in various stages of technological process presented in Table 1. The analysis demonstrated that only 14.6% of the enterprises implement the initial stage (forest works and services); 46.3% of companies perform the

second stage of the process, or primary processing; and the third stage, or secondary processing is produced by 67.5% of enterprises; 40.7% of enterprises have the stage of production of furniture and furniture parts; fuel wood, or the fifth stage, is produced by 41.5% of the enterprises. It is obvious that the value added at each subsequent technological stage of the process indicates more intensive processing of initial raw materials and facilitates an increase in share of timber processing complex with high added value.

Table 1. Distribution of products and services among the technological stages of the timber processing complex

Stages of technological chain	Aggregate production groups
1. Forest works and services	1.1.Services (5 groups of services)
2. Primary processing	2.1.Lumber (7 groups of product)
	2.2.Panels (9 groups of product)
3. Secondary processing	3.1.Construction timber (4 groups of product)
	3.2.Pallets and packaging (5 groups of product)
	3.3.Landscape products (7 groups of product)
	3.4.Items of carpentry and joinery production (9 groups of product)
	3.5.Wooden houses (3 groups of product)
4. Furniture and furniture parts	4.1.Furniture (9 groups of product)
	4.2.Furniture details (7 groups of product)
5. Firewood	5.1.Firewood (5 groups of product)

It is worth noting that such grouping presupposes that the same companies are simultaneously included in several selected groups; moreover, the greater is the number of groups where the enterprise is included, the bigger is the amount of technological stages it participates, and, consequently, implements the vertical integration at higher degree.

It also should be noted that the specialization prevails over the vertical integration if to distribute the companies according to the manufactured aggregate groups of products.

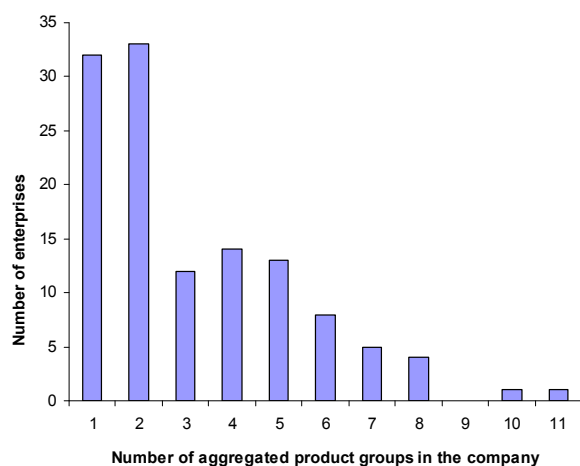


Fig. 2. Distribution of timber processing complex enterprises by the number of aggregated product groups

As it can be seen in Figure 2, almost half of the enterprises (54.8%) specialises in the manufacturing the products presented in aggregate groups 1–2 (of the eleven considered). About one third of the enterprises (29.3%) have 3–5 groups in the range of their products. One fifth of all companies carry 6 or more items in their product and services range, including only two companies producing more than 10 items of product aggregated kinds.

Limited availability of information at the microeconomic level does not allow a detailed assessment of the efficiency of production in enterprises of timber processing complex, considered in this paper; it can be done neither for every separate type of goods (and services), nor for an aggregated product group. Nevertheless, consideration of the efficiency of production in terms of the above outlined groups permits to reveal the certain regularities confirming the hypothesis about the positive impact of vertical integration on the production efficiency. There can be simultaneously stated an increase in the share of the products with high value added in the total volume of the complex output.

Figure 3 shows average weighted values of the profitability of primary production according to five groups of break-even enterprises demonstrating different levels of vertical integration. The first group includes companies specialising in one stage of technological process; each subsequent group

has the number of stages increased by one, thereby the fifth group is represented by companies integrating five separated manufacturing steps.

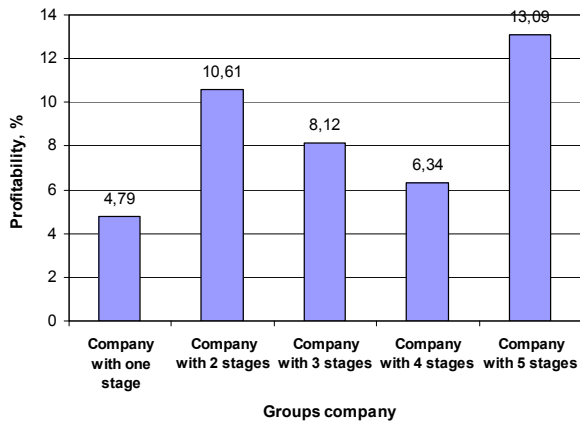


Fig. 3. Profitability of enterprises with different levels of vertical integration

The process of determining the values of profitability shown in the graph above included the procedure of weighing performed according to the turnover of enterprises; this fact allows taking into account the real impact of each enterprise on average level of profitability in accordance with its contribution to the economic performance of the group even under condition of considerable dispersion of profitability values (standard deviations in groups ranged from 3.25 to 5.58).

As Figure 3 demonstrates, the highest average weighted profitability value is 13.09% for a group of companies with a full production cycle, in other words, vertically integrated at the highest degree. Otherwise, the companies having only one processing stage demonstrate the minimum value of profitability of 4.79%.

There is a certain peculiarity in the sample under consideration, and this peculiarity requires special interpretation. The greatest dispersion of the values of profitability for enterprises belonging to different groups is in the first group representing one production stage (from 0.03% to 24.0%). The lowest dispersion is in the fifth group, performing a complete cycle (from 6.0% to 14%).

This apparent contradiction can be explained by the fact that not only integration but also production specialisation affects positively the improvement of production efficiency, including one evaluated through the level of profitability. This fact allows substantiating the highest level of profitability (24%) of the enterprise “Bolderaya” Ltd; the company specialises in certification services in the field of timber processing industry.

Analysis of the economic performance of the enterprises of complex grouped according to the

second principle, or by the presence of specified process stages in the production procedure (starting with the first one (forest works and services) and to the fifth one (firewood production)), is graphically presented in Figure 4.

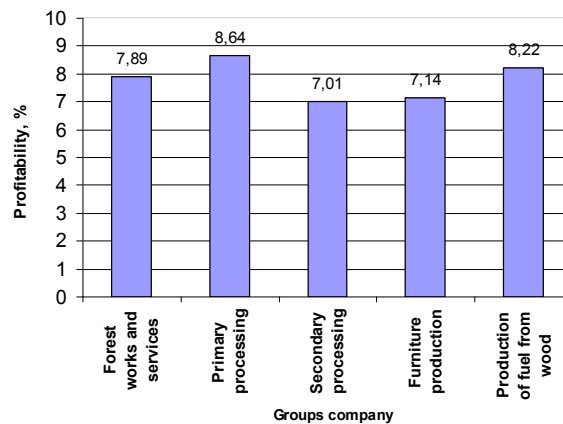


Fig. 4. Profitability of enterprises presenting different stages of production

Taking into consideration the aforementioned peculiarities of groups' formation shown in Figure 4, it can be argued that the vertical integration in complex enterprises facilitates levelling the profitability values of enterprises and promotes increase in share of products with higher value added in their product range. The point is that this type of grouping results in the situation when the same companies are simultaneously represented in the structure of several selected groups. Being influenced by various market factors, businesses have a great opportunity to choose the most favourable combination of employment of the factors for improving their economic performance.

For example, pricing factors have different effects on economic results of production and sales of various types of products. Furniture industry, being the final stage in the chain of timber processing is characterised by high value added and has a high potential of profitability. However, taking into consideration strong competition in the furniture market, Latvian manufacturers keep to the strategy of low and average prices; this strategy restrains the possibility of profit growth and increase in profitability. Figure 4 demonstrates that the enterprises having in their structure furniture production, present lower indicators in comparison to all other technological stages in terms of profitability (7.14%); it does not concern the secondary processing: construction timber, pallets and packaging materials, landscape products, carpentry and joinery, wooden houses (7.01%).

The opposite situation occurs at businesses, having in their structure the firewood production:

fuel wood chips, firewood, wood briquettes and granules, fuel wood shredding. Comparatively high levels of return (8.22%) is provided by two factors: on the one hand rather low production costs due to the fact of using the return material of other production process stages as initial resources, and on the other hand the possibility of using a strategy of high prices as a result of tense fuel-energy balance in Latvia.

2. Impact of Vertical Integration on the Efficiency of Enterprises Performance

General regularities in the performance of enterprises under the influence of vertical integration, discussed above as a part of certain groups of companies, are implemented on the background of other factors as well. Therefore, there presented the sampled data on two above

Table 2

Data on activities performance of enterprises having different levels of vertical integration (year 2011)

Enterprises	Integration factors		Net turnover, thousands of lats	Profit, thousands of lats	Profitability, %	
	Number of stages	Number of product types			Primary operations	Gross profit
JSC "LATVIJAS FINIERIS"	4	10	169 000	13 520	8	22
"LATSIN" Ltd	1	3	75 572	3 023	4	12
"LASKANA" Ltd	2	10	12 206	1 221	10	12
"OŠUKALNS" Ltd	5	17	13 893	1 945	14	33
"VĀRPA" Ltd	5	41	5 100	663	13	13
"REMTES TRANSPORTS" Ltd	3	9	1 922	96	5	10
"AJ ENERGY" Ltd	2	6	627	25	4	9

These data visually show that the vertically integrated companies have a higher level of profitability. For instance, "OŠUKALNS" Ltd and "VĀRPA" Ltd having in their production structure all five process stages and the most extended range of products (17 species and 41 species, respectively) demonstrate the highest level of profitability in this sample. In its turn, the company "LATSIN" Ltd specialising in forest works and services only (the first process stage) has the lowest level of profitability in this sample.

Graph in Figure 5 clearly demonstrates that the sample under consideration illustrates the original hypothesis: vertical integration among companies having in their structures the first stage, after inclusion of each successive stage of the process not only increase the value added in the production of the enterprise, but also increase the production profitability. This dependence is valid both for large manufacturers such as JSC "LATVIJAS FINIERIS", having the turnover of 169 million lats and 13.5 million lats of profit and for relatively small businesses, presenting the volume and absolute financial indicators for two - three orders of magnitude less.

represented groups; they permit to illustrate the regularities of positive effects of vertical integration on profitability of production and, consequently, on increase of the share of products with higher value added.

There is shown the performance of seven companies (Table 2); these companies have been selected from the group of businesses having the initial stage of production in their business structure: forest works and services. It is possible to say that this sample illustrates the "forward integration" according to the above presented definition; though it does not aspire to determine the mechanism of integration. The selected enterprises differ in both total turnover (from 169 million to 627 thousand lats) and the number of process stages (from one to five) and the number of product types (from 3 to 41).

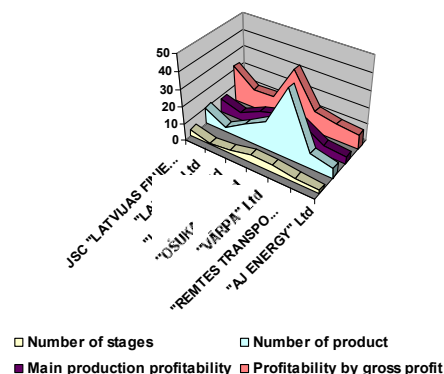


Fig. 5. Profitability of enterprises having the first process stage

According to the analysis of similar sample of group of businesses having the fifth stage in their production structure (production of firewood), the above mentioned regularity can also be noted. Under certain assumptions this group presents illustration of "backward integration". Figure 6 demonstrates that the company "SWEDWOOD LATVIA" Ltd, which has only two production stages, does not present the same level of

profitability as other four companies do. "OŠUKALNS" Ltd and "VĀRPA" Ltd included likewise in this group since they have all five process stages in their structures of production, also have the highest level of profitability.

Enterprises "GAUJAS KOKS" Ltd and "WENDENEN FURNITURE" Ltd having three stages in their structure of production take an intermediate position in profitability level: 12% and 10% respectively. At the same time these two businesses differ by volume and absolute financial performance by more than an order of magnitude: their turnovers are 48 669 thousand lats and 2031 thousand lats respectively, and their profit levels are 5840 and 203 thousand lats respectively.

Consequently this example allows affirming that vertical integration enhances economic performance regardless of the size of enterprises.

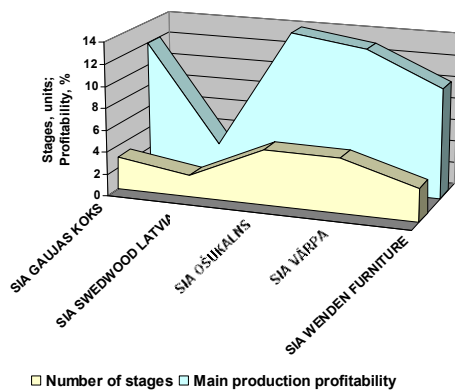


Fig. 6. Profitability of production of enterprises with the fifth process stage

Conclusion

This article visually demonstrates the strategic importance of timber processing complex for

Latvian economy. The investigation of the industry structure as well as the certain aspects of its members behaviour, such as formation of a different structure of production provide favourable opportunities for increasing the market share of products with higher value added; moreover, these enterprises can have different foundation: in some cases they are based on a fairly narrow specialisation of production while in other on vertical integration. Many companies of the industry find considerable opportunities in this area in more intensive implementation of the principles of vertical integration of production.

References

1. Latvian Agency of investments and development. *Forestry in Latvia*. 2014. [http://www.liaa.gov.lv/files/liaa/attachments/kokrupnieciba_ru_spreads_labots_0.pdf].
2. *Latvian Forests. Facts*. 2014. [http://www.lvm.lv/lat/mezs/par_mezu].
3. Lursoft. *Annual Reports*. [<http://www.lursoft.lv/lap-saext?act=urgpsearch&lang=en&aid=>].
4. Stetjuha, A. *Industrial Economics*. Course book. Transport and Telecommunication Institute. Riga. 2004.
5. Vasyilkova, T. *Certain issues of assessing the efficiency of integration processes within timber production complex*. Russian Entrepreneurship. 2011. No.3, Vol. 2 (180). pp. 175-179. [<http://www.creativ-economy.ru/articles/11764>].
6. Velker A. *So inconsistent vertical integration in Russia*. 2014. [<http://newsland.com/news/detail/id/929078/>].
7. Vityabsky, V., Kulichkov, E., Lifanov, N., Shatrakov, Y. *The ways of integration of Russian economy*. Economic Strategies. 2004. vol. 2. pp. 34-39.