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COMPETITIVENESS ALONG ROMANIAN VEGETABLE SUPPLY CHAIN

Agrifood chains have experienced dynamic changes in recent times, due to the development and fast growth of retail trade, on one hand, and of the processing factories, on the other. This dynamics is also revealed by the change of agricultural production marketing modality, by the shift from traditional spot market to the sale on coordinated markets. This situation can represent an opportunity for Romanian vegetable farmers, yet high standards imposed to farmers (quantity, quality, delivery schedule, food safety) and the related transaction costs may limit these opportunities. This situation is reflected in the vegetable chain competitiveness level, which is investigated in this paper on the basis of certain indicators such as farm structure, concentration and consolidation of processing companies and retailers, farmers' participation in retail chains, coordination along the chain and logistics.

Keywords: Romania; vegetable supply chain; competitiveness; farmers; retail; logistics.

JEL Classification: Q110.

Корнелія Албойю

КОНКУРЕНТОСПРОМОЖНІСТЬ У ЛАНЦЮЖКУ ОВОЧЕВИХ ПОСТАВОК У РУМУНІЇ

У статті показано, що ланцюжки агропродовольчих поставок останнім часом зазнали динамічних змін у зв'язку з розвитком і швидким зростанням роздрібної торгівлі, з одного боку, і фабрик з переробки сировини, з іншого. Подібна динаміка з'явилася через зміни модальності маркетингу сільськогосподарського виробництва у зв'язку з переходом від традиційного ринку до продажів на скоординованих ринках. Дана ситуація може надати великі можливості для румунських фермерів, але високі стандарти, які пред'являються фермерам (кількість, якість, терміни поставки, безпека харчових продуктів), а також відповідні витрати за угодами можуть їх обмежувати. Ця ситуація відбивається на рівні конкурентоспроможності ланцюжка поставок овочів. Досліджено такі показники: сільськогосподарська структура, концентрація і консолідація переробних підприємств і роздрібних торговців, участь фермерів у роздрібній мережі, координація в ланцюжку і логістика.

Ключові слова: Румунія, ланцюжок овочевих поставок, конкурентоспроможність, фермери, роздрібна торгівля, логістика.

Рис. 5. Таб. 3. Літ. 15.

Корнелія Албойю

КОНКУРЕНТОСПОСОБНОСТЬ В ЦЕПОЧКЕ ОВОЩНЫХ ПОСТАВОК В РУМЫНИИ

В статье показано, что цепочки агропродовольственных поставок в последнее время испытали ряд динамических изменений в связи с развитием и быстрым ростом розничной торговли с одной стороны и фабрик по переработке сырья с другой. Подобная динамика появилась из-за изменения модальности маркетинга сельскохозяйственного производства, в связи с переходом от традиционного рынка к продажам на скоординированных рынках. Данная ситуация может представить большие возможности для румынских фермеров, но высокие стандарты, предъявляемые фермерам (количество, качество, сроки поставки, безопасность пищевых продуктов), а также

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соответствующие затраты по сделкам могут их ограничивать. Эта ситуация отражается на уровне конкурентоспособности цепочки поставок овощей. Исследуются такие показатели: сельскохозяйственная структура, концентрация и консолидация перерабатывающих предприятий и розничных торговцев, участие фермеров в розничной сети, координация в цепочке и логистика.

Ключевые слова: Румыния, цепочка овощных поставок, конкурентоспособность, фермеры, розничная торговля, логистика.

1. Introduction. The vegetable chain in Romania is characterized by high risks and uncertainty. Due to great weather variations from one year to another, the total productions and yields are significantly different. As a result, the volatility of prices and yields is extremely high. As a rule, in the years with good yields and productions prices go down, while in the years with low yields, prices are up. It seems that Romania's membership in the EU has not contributed to the diminution of volatility, and small vegetable farmers continue to be confronted with the competitiveness level issue. The objective of the paper is to determine the competitiveness along the chain at national level and at the level of certain important vegetable basins.

The vegetable market in Romania has some particularities that differentiate it from the markets of other agricultural products, among which the most important are: atomization of demand and supply, seasonality of vegetable products, zonality of vegetables and existence of a poorly developed marketing system; at the same time, the demand for vegetable products has a continuous character, while the supply is seasonal. This results in a high price volatility. As long as the area under heated glasshouses is quite small, producers cannot benefit from high prices over the winter; in this period of the year, most vegetables come from imports, mainly from Greece, the Netherlands and Turkey. In the vegetable sector, individual holdings have the largest share of cultivated areas (over 95%), which practically leads to an excessive supply fragmentation, also with implications upon prices. The quality of vegetables also influences their price. Among the factors that influence the vegetable production quality are: seeds quality, plant density, optimum water supply. Certain farmers do not respect the optimum density, and this impacts production quantity and quality. At the same time, the specific water supply should be respected, and the inefficiency of the irrigation system (the irrigation water is not supplied at the right moment) adversely impacts production quality. As regards logistics and distribution, farmers do not have adequate sorting and packaging equipment, which hinders their access to large store chains to sell their production and obtain stable and constant prices throughout the year. Concerning the coordination along the chain, the number of formal contractual arrangements mainly at the farmer-customer segment is very low (Alboiu, 2010).

The objective of this paper is to study the competitiveness of the sector by counties taking into account several competitiveness indicators among which: market structure, market regulations and organization, coordination along the chain, logistics and distribution.

2. Previous studies and research methodology. The dynamics of the global agri-food system is also reflected in the change of Romanian agri-food system. Among the factors that contribute to this change, the following can be mentioned: industrialization, globalization, trade liberalization, technology change (advanced production systems, logistics and information technology), structural adjustment, diminution of

support to farmers, consumers' food quality and safety requirements. These changes can provide opportunities to farmers but at the same time they also bring about a lot of challenges (Saxowsky and Duncan, 1998; Reardon and Barret, 2000).

Agricultural transactions that traditionally took place on the spot market are more and more often made on vertically coordinated markets, imposing new requirements and adaptation for farmers and alters traditional commercial relations (Saxowsky and Duncan, 1998; Peterson et al., 2001). An important example in this respect is the system of acquisitions used by retailers and processors, which is mainly based on contractual arrangements (Reardon and Berdegue, 2002).

In this context, in Romania a fast increase in the number of multinational companies and consolidation of store chains is currently taking place, which begin to dominate the agrifood system, determining deep changes along agricultural chains, the vegetable chain included. Vegetables are among agricultural products in demand by retail chains, which by tradition are sold in Romania through intermediaries and at spot markets. Our country is on the second place in the EU after France as regards the sales per square meter in large store chains, before Spain and Germany, which could represent both a challenge and an opportunity for Romanian vegetable farmers in the situation they are able to penetrate this segment of the chain. Worldwide, retail chains use their own acquisition system based on contractual arrangements with specialized wholesalers and/or with farmers that can meet high standards imposed (Alvarado and Charmel, 2002). As regards chain competitiveness, the specialized literature presents several driving factors on the basis of which competitiveness can be investigated, namely: 1. market structure; 2. production quality; 3. market regulations and organization; 4. coordination along the chain; 5. logistics and distribution; 6. value added; 7. costs.

1) *Market structure*. It defines the conditions in which a chain operates. It presents the fragmentation level along different segments in a chain, market size and trade balance (Weindlmaier, 2000). These indicators are important in order to evaluate chain's competitiveness; for example, the fragmentation level is determined for the coordination along the chain; the possibility to create scale economies can contribute to chain coordination increase.

2) *Production quality*. Quality means comfort, security, safety, variety (Hofwegen et al., 2005). The improvement of quality along the chain is expressed by a better quality for consumers. Obtaining a standard set of quality attributes is more important than obtaining the best quality (Food Chain Centre, 2003a; 2003b).

Another quality indicator is the certification level obtained by a company, for instance ISO or HACCP. The availability and existence of a qualified quality control staff in processing units represents a key element in ensuring quality. At the same time, farmers' knowledge referring to production quality and the level of quality requirements imposed by contractual terms established between producers and sellers represent important factors that can influence product quality (Garcia et al., 2003). Also, many authors consider that the existence of an advanced and efficient traceability system may be a key element in quality improvement along the chain (Hughes & Merton, 1996; Jack et al., 1998).

3) *Regulations and market organizations*. Regulations define the conditions in which economic operators from a certain chain carry out their activity. There are two

types of regulations, i.e. public and private. Private regulations come from the initiative of the sector itself and they differ in scope and size. For instance, EUREP-GAP must be applied by most retail chains in the EU. Practically, there are very well-defined regulations as regards agrifood chains at the EU level. However, this paper will refer only to market organization of producers and producers' groups in Romania.

4) *Coordination along the chain.* The coordination along the chain tries to ensure a good interaction between companies and/or farms, through the existence of a certain organization level. In order to create a certain organization level, governance mechanisms between the involved (stakeholders) are needed, constructed by participants to the chain, such as contracts (formal relations) and informal norms (trust).

4.1) *Contracts.* As regards the formal contracts, Hornibrook & Fearn (2005) consider that the chains are mostly efficient when the signed contracts recognize the potential risk perceived at the level of each segment in the chain and provide incentives for covering this risk. The highest risk for producers of vegetables is the volatility of incomes resulting from the fluctuations of vegetable prices. On the other hand, traders can feel the risk in the situation of certain food safety scandals.

4.2) *Trust along the chain.* This indicator can be considered as a type of informal norm that acts on different segments of a chain. Good relations and trust between the partners operating in different segments of a chain represent an important driving engine for successful coordination of a chain (Hornibrook & Fearn, 2005; Schiefer, 2002; Jack et al., 1998). In general, where there is trust along the chain, prices are negotiated in contracts, while the lack of these signals out the low confidence level on different segments of the chain.

5) *Logistics and distribution.* In general, logistics implies the physical movement of goods from one place to another (Lummus et al., 2001). Logistics can be also defined as "planning, implementation and efficient control of transmission and storage of the flow of goods, services and information between the point of origin and the point of consumption". The competitiveness of logistics organization along the chain very much depends on the efficiency of the chain. However, the basic structure of logistics is determined, for a large part of chains, outside the chain, by market structure, transport, type of product and production process.

6) *Value added.* The value added along the chain represents the increase of the value of product throughout the chain. Additional processing of a product and good marketing add value to the product. The value added is represented by a gross figure that includes processing or marketing costs. The value added can be created in 2 modalities: by increasing the quality of products in a shorter time than competitors or by launching new products, by improving the production process (e.g., increasing the efficiency of internal processes, such as rotation of stocks, increase of delivery frequency) (Kaplinsky & Morris, 2005; Food Chain Centre, 2003);

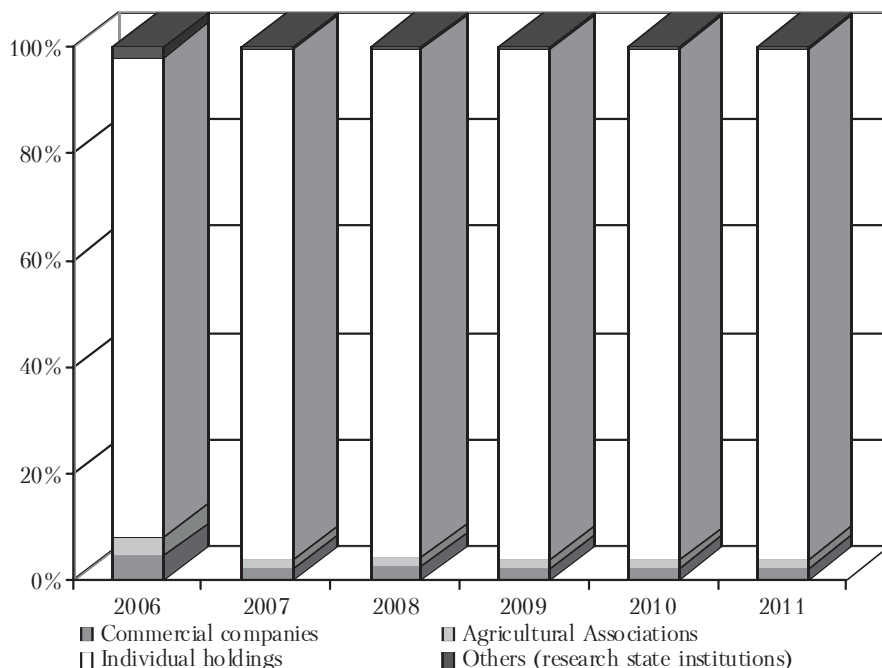
7) *Costs.* Within a certain chain, a farm or a company can obtain a competitive advantage when the input price is lower than the input price in other chains. The costs are influenced by price, quality, utilized inputs (fertilizers, pesticides, seeds). As the vegetable chain is dominated by small individual farmers, transport cost may also be high sometimes. However, in the EU old member states, the primary sector fragmen-

tation is often compensated by strong organization of producers (Garcia et al., 2003). Costs could be lowered by increasing production homogeneity, lowering handling and delivery costs.

The remaining of this paper is structured as follows: section 3 presents the main competitiveness indicators analyzed, section 4 presents the aggregated competitiveness indicator by counties, and section 5 concludes.

3.1. Market structure; farm structure. The land area under vegetables represented 3.4% of the total cultivated arable area in 2010. At the European Union level, its share is almost the same, but in Romania the consumption needs are not covered yet by domestic resources. In 2010, the main cultivated vegetables were the following: tomatoes – 19%, cabbages – 18%, dry onions – 13%, green peppers – 8%. In value terms, the vegetable production represented 19% of the total value of crop production in 2010.

In the vegetable sector, individual holdings have the highest share in the cultivated areas (over 95%) (Figure 1), which practically leads to an excessive fragmentation of supply, with direct implications upon the size and volatility of prices.



Source: NIS, online.

Figure 1. Cultivated areas by types of vegetable holdings

By size classes, 53% of agricultural holdings cultivate field vegetables on the areas ranging from 1 to 5 ha, and 34% of these cultivate field vegetables on the areas under 1 ha. Similar percentages are noticed in the case of agricultural holdings that cultivate vegetables in vegetable gardens in order to sell them (Table 1), as well as in glasshouses and under plastic tunnels; in the case of glasshouses and plastic tunnels, the share of those who cultivate areas of 1-5 ha is slightly higher (60%).

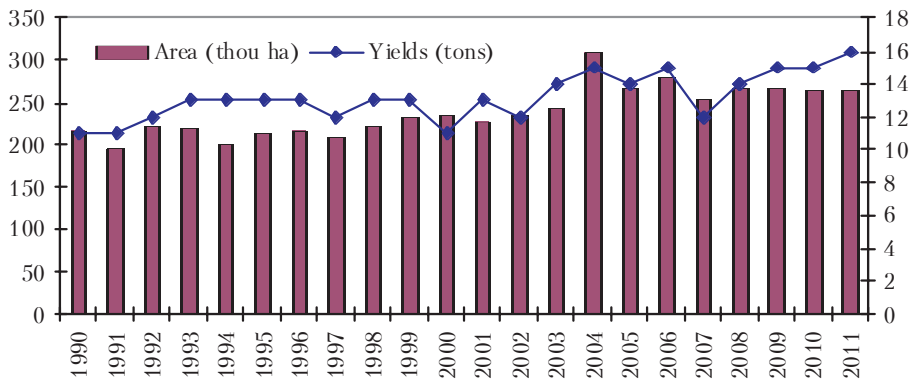
Table 1. Agricultural holdings by size classes and categories of use

	Under 1 ha	1–5 ha	5–10 ha	10–50 ha	50–100 ha	Over 100	Total
Field vegetables	34%	53%	10%	3%	0.1%	0.1%	100%
Gardens	34%	51%	11%	4%	0.1%	0.1%	100%
Greenhouses and solarium	26%	60%	11%	3%	0.2%	0.1%	100%

Source: Farm Structure Survey, 2008, NIS.

The cultivated area had a slightly increasing evolution, with the maximum of 308 thousand ha in 2004, 3.6% of the total cultivated area respectively and the minimum of 252.4 thousand ha in 2007, i.e. 3.3%. In 2008, the cultivated area slightly increased to reach 269 thousand ha, a similar level to that in 2001, but it slightly decreased in 2010 to 262.6 thous ha.

High variability of average yields is the result of the oscillating evolution of weather conditions. Economic efficiency and average yields per hectare in the vegetable sector depend on economic and environmental factors and on the tradition and experience in vegetable farming. The average yields slightly increased in the last 3 years for the main types of vegetables, including tomatoes (Figure 2).



Source: NIS, online.

Figure 2. Cultivated tomato area and average yields, 1990-2011, %

3.2. Market regulations. For producer and organizations to be recognized, these have to comply with all the minimum conditions specified by the current legislation with regard to: statutory provisions, number of members, minimum value of sold production, organization and endowment. The producers' groups have the obligation to design a recognition plan. In order to do this, they ask for the services of specialized firms.

Initially, since 2007, 44 producers' groups in the fruit-vegetable sector gained preliminary recognition, yet at present there are only 26 groups left, practically half of the previous number. The Ministry of Agriculture withdrew the preliminary recognition notification in 2011. At this moment, 34 producers' groups in the vegetable sector are recognized according to Government's Ordinance no. 37/2005 approved by Law no. 338/2005 and Ord. no. 171/2006; and 1 producers' organization recognized according to (EC) Regulation no.1182/2007 of the Council in the fruit and vegetable sector.

3.3. Coordination along the chain. The coordination level along the vegetable chain is very low. This is revealed by the results of certain interviews with main players in the chain, conducted in a few counties specialized in vegetable farming in the south-eastern part of the country, as presented in the Table 2.

Table 2. Formal commercial relations

	Farmer-middlemen	Farmer-processor	Farmer-retailer	Processor-retailer
Formal relationship, %	14/280, 5%	28/280, 10%	20/280, 7%	2/6, 33%

Source: field survey, 2011.

The figures in Table 2 reflect the low level of formal relations along the chain. Higher percentage of formal relations can be noticed on the processor-retailer segment. The results practically prove the higher organization and coordination tendency downstream the chain and less in the primary production segment.

As regards the contractual relations and confidence in business partners, the respondents were asked to evaluate on the scale from 1 to 5 (1 – extremely poor to 5 – very good) their opinion on the following contractual aspects: history of the relation with customer, the respect of contractual terms, confidence in a commercial partner, contract execution. The results of the survey are presented in Table 3.

Table 3. Farmer-client relationships and contractual aspects, %

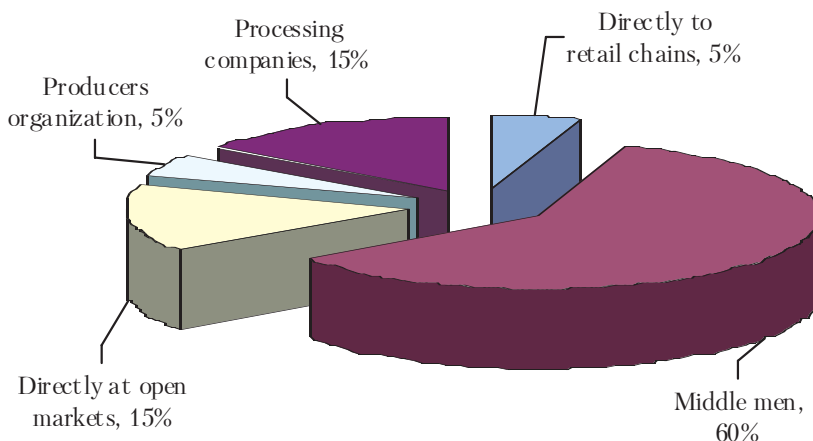
	Very good	Good	Neither good, nor poor	Poor	Extremely poor
The history relationship with the buyer is	8	12	20	22	38
The respect of contractual terms is	4	11	18	25	42
The trust in our partner is	5	15	25	25	30
The enforcement of this contract is	5	6	10	31	48

Source: Calculations based on the field survey, 2011.

Contract execution is the most difficult problem the farmers are facing. The level of trust between commercial partners and the history with customers has also very low levels. Another problem is represented by imports, the quality of which is not rigorously checked at present. The production of many vegetables has a seasonal character, and the products have to be consumed immediately after harvesting or delivered to processors.

3.4. Logistics: Storage, distribution and marketing of vegetables. The storage is difficult and there are few storage premises. At present, there are only a few warehouses, insufficient to meet the demand. As a result, it is necessary to build up glasshouses and warehouses endowed with cooling equipment for a specialized production.

The sale is the most difficult problem because certain institutional benchmarks regarding the operation of specific markets for the sale of vegetable production are not respected. Furthermore, the farmers who produce vegetables in small amounts lower the prices very much, to the disadvantage of those involved in vegetable farming as a main activity and earn their living from the sale of their products. The production is sold directly on the market or from farms through intermediaries. Part of the production goes to processing, mainly in the situation when a farmer concluded a formal contract with a processing company (Figure 3).



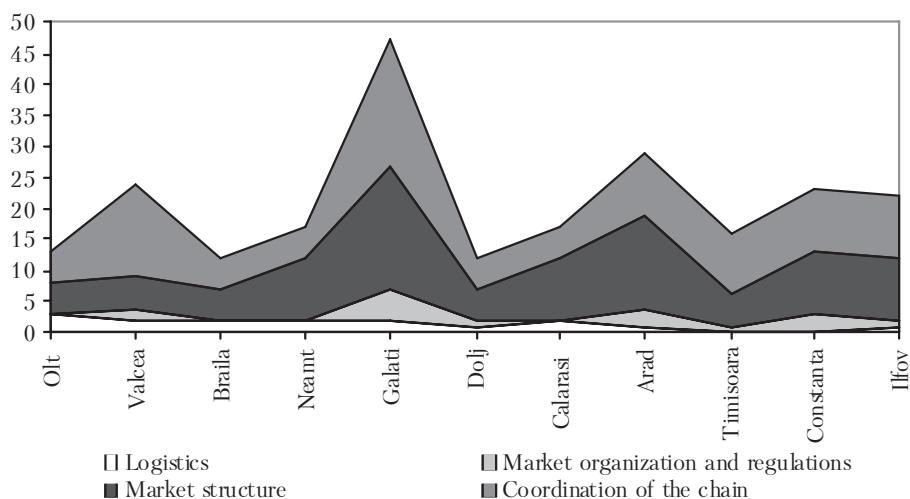
Source: Own estimations based on interviews with stakeholders of vegetable chain.

Figure 3. Sale of vegetables

Vegetables farmers feel threatened by large hypermarkets as well as by massive imports. On one hand, retail chains refuse to buy the merchandise at a fair price, and on the other hand, imports compete against domestic production unfairly. Practically, farmers cannot benefit from the opportunity to sell through large retail chains due to their poor organization and to the transaction costs that they have to bear, as well as due to uncontrolled imports, in the conditions when the number of modern stores developed very much. However, the factors that hinder small farmers from selling their production through large retail chains remain under question: while there are no ex-ante or ex-post contractual relations between buyers and sellers at traditional markets, the acquisition system of retail chains needs coordinated relations with suppliers in order to guarantee a constant and efficient supply system. While at traditional spot markets economic transactions are mainly governed by price, at the vertically coordinated markets there are further institutional arrangements between buyers and sellers (Peterson et al., 2001).

4. Aggregate competitiveness along the chain based on competitiveness indicators.

Figure 4 below presents the competitiveness along the chain on the basis of competitiveness indicators discussed from the methodological point of view in Section 2 of this paper and empirically investigated in Section 3. This aggregate chain indicator, proposed by the author, through the weighting of 4 competitiveness indicators considered for this approach (due to space limitation), was calculated on the basis of the author's estimations and of the analysis presented in Section 3. It can be noticed that the county Galati has the highest competitiveness level for all the 4 indicators used in the calculation of aggregate competitiveness along the chain: logistics, market structure, market regulations and organization, market coordination. The county Valcea has quite a high aggregate competitiveness indicator, with a good organization level along the chain. The county Arad also stands out by a higher competitiveness indicator, with a slightly better market structure as compared to other counties. Constanta and Ilfov are counties with a quite high competitiveness along the chain, occupying the 4th and 5th positions in this hierarchy, in which producers' groups exist and the coordination along the chain is quite good.



Source: Author's estimations based upon the field surveys, statistical data.

Figure 4. Competitiveness along the chain as measured by competitiveness indicators

5. Conclusions. The vegetable chain competitiveness is low due to strong fragmentation at the level of primary production, logistics and distribution, to the poor organization on the downstream segment of the chain, as well as to uncontrolled imports. Practically, throughout the investigated period, the trade balance was always negative for fresh vegetables and processed tomatoes. The results of the investigated indicators reveal that the vegetable basin of Galati county has high competitiveness along the chain, followed by Arad and Valcea. This allows a better understanding of current situation and the main driven forces for competitiveness in Romanian vegetable supply chain and also to rank the counties according to their level of competitiveness.

Acknowledgments. "This work was supported by the project "Post-Doctoral Studies in Economics: training program for elite researchers — SPODE", cofunded from the European Social Fund through the Development of Human Resources Operational Programme 2007-2013, contract no. POSDRU/89/1.5/S/61755".

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Стаття надійшла до редакції 13.12.2012.