REVIEW PAPER
UDK: 502.171:620.9]:338.1(497.11)
502.131.1:620.9
Date of Receipt: June 20, 2016

Olga Gavrić
University of Belgrade
Faculty of Agriculture
Department of Economics

Đorđe Kaličanin
University of Belgrade
Faculty of Economics
Department of Business Economics and Management

GREEN CLUSTERS AS ONE OF THE POTENTIAL PILLARS OF LONG-TERM SUSTAINABLE ECONOMIC GROWTH

Zeleni klasteri kao jedan od potencijalnih stubova dugoročno održivog ekonomskog rasta

Abstract

In the last twenty years, the "green" business has become a popular business concept in the global economy. Continuing changes in the business environment and increasing attention on the environment protection necessitated a change of perspective and strategic shift towards more efficient use of resources and collaboration with other companies within the value chain and beyond, in the form of clusters. Energy-efficient operation, as well as respect for all the principles of circular economy, represent a special challenge for enterprises, but also new opportunities for acquiring and improving competitive advantage. With this in mind, the "green" clusters represent one of the ways to achieve that aim. Clusters as such have the potential for improvement of micro and macro-competitiveness through the convergence of environmental and economic goals.

Keywords: *green clusters, circular economy, renewable energy, value, competitive advantage*

Sažetak

U poslednjih dvadeset godina, "zeleno" poslovanje postaje popularan poslovni koncept u globalnoj ekonomiji. Kontinuelne promene u poslovnom ambijentu, kao i sve veće poklanjanje pažnje životnoj sredini, uslovile su promenu vizure preduzeća i strategijski zaokret ka efikasnijem korišćenju resursa i kolaboraciji sa drugim kompanijama unutar lanca vrednosti i šire, u vidu klastera. Energetski efikasno poslovanje, kao i poštovanje principa cirkularne ekonomije, predstavljaju svojevrsni izazov preduzećima, ali istovremeno i nove mogućnosti za sticanje i unapređenje konkurentske prednosti. Imajući to u vidu, "zeleni" klasteri predstavljaju jedan od načina za ostvarenje pomenutog cilja. Klasteri kao takvi imaju potencijal za unapređenje mikro i makro konkurentnosti kroz približavanje ekoloških i ekonomskih ciljeva.

Ključne reči: *zeleni klasteri, cirkularna ekonomija, obnovljivi izvori energije, vrednost, konkurentska prednost*

Introduction

Clusters are geographic concentrations of interconnected companies and related institutions engaged in the corresponding activity, which are connected by common characteristics and complementarities [18, p. 202]. Michael Porter was the first to introduce them into the economic literature and to point out the role of clusters in the creation and improvement of competitive advantage. Growth of competitiveness is associated with an increase in productivity and growth of innovation that are the result of exchange of knowledge, information, modern ideas and the use of common resources. Success of the cluster stems from the synergy that occurs as a result of cooperation between the different companies in the value chain, but also universities, development agencies, governments and other institutions.

On the other hand, global economic trends and volatile business environment, with a high degree of uncertainty, constantly impose new business challenges to modern companies. In the last twenty years, concepts such as energy efficiency and sustainable development have become imperatives of modern business companies. Companies increasingly pay attention to the environment, as well as to the "green" business. In other words, their production processes become more environmentally efficient, with a tendency to reduce the cost of environmental protection through the use of cleaner technologies and greater use of alternative energy sources.

New "green" context of business and the change of paradigm have become an opportunity for the creation and improvement of competitive advantage and value growth. Consequently, these changes in the business environment and global trends have implied a thorough strategic approach to the company in terms of formulating environmental strategy, which must be consistent with the corporate strategy. In this way, diametrically opposed economic and environmental objectives of the business are often converging.

Bearing in mind the abovementioned facts, the focus of this work will be precisely on analyzing the role of green clusters in improving both competitiveness at the company level and at the level of competitiveness of the national economy. In the first part of this paper, features of circular economy as a new model of the functioning of the global economy and the importance of alternative forms of energy in modern trends of business will be briefly analyzed and presented.

In the second part, the focus will be on green clusters and their role in developed and developing economies. In a global economy, the concentration of green clusters is augmenting and their success is confirmed by the experience of developed economies. On the other hand, green clusters in the Serbian economy are in the early stages of development. A comparative analysis will help us in identifying the existing gaps and basic guidelines for the future development of green clusters in the domestic economy.

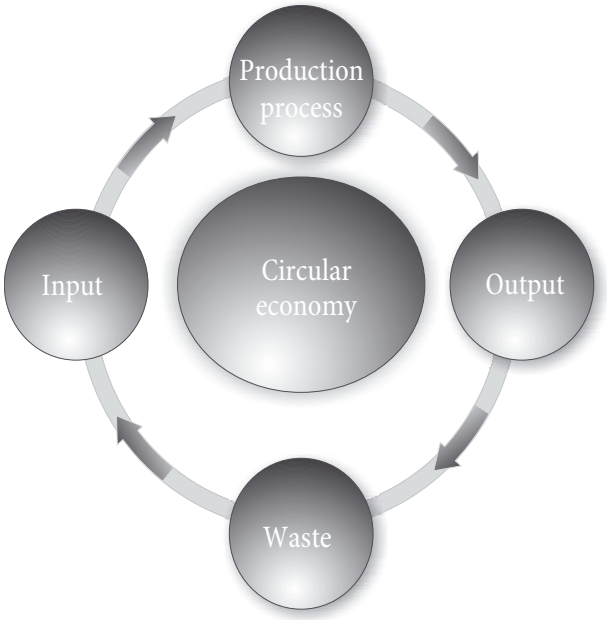
Circular economy as a precondition for long-term sustainable economic growth

In the last twenty years, continuous global changes have led to changing of the business paradigm worldwide. Companies increasingly pay more attention to the environment, which is reflected in increased investment activity in this sector, as well as in the acquisition of "cleaner" technologies which are certainly in the function of energy efficiency and sustainable development. Energy efficiency refers to minimizing the amount of energy in achieving certain production or technological process and, on that basis, a reduction in operating costs. Also, the aforementioned concept is closely tied to the idea of circular economy, which aims to increase the resource efficiency and the use of renewable inputs and, furthermore, reduce waste and other harmful substances that heavily pollute the environment.

As such, the model of circular economy assumes changes throughout the product life cycle, ranging from product design, production and marketing of new models, towards new ways of customer behaviour [20, p. 89]. In accordance with this fact, the products are becoming the "new" inputs in other manufacturing processes at the end of their life cycle, as presented in Figure 1. Also, the circular economy aims to completely replace the linear model which was dominant in the world economy, and

which was based on the principle of "take-make-consume-postpone", which ultimately undermines the long-term environmental goals and standards. It is important to emphasize that technological innovation plays a crucial role in shifting the conventional linear economic system to the objectives of circular economy [12, p. 384]. On the other hand, the support and macroeconomic policy are necessary, whose focus moves from the maximization to economic sufficiency and sustainability.

Figure1: Circular economy



Source: according to [12, p. 384]

The implementation of the circular economy model encouraged further innovation processes and also stressed its relevance for increase of the competitiveness of both enterprises and economies. All these changes, as well as greater involvement of renewables, have contributed to the reduction of operating costs of global companies, as well as to large savings through the emission of CO_2. Some of the most important benefits will be mentioned here [18, p. 359]. Firstly, companies achieve savings in material arising from the substitution, reuse or recycling of production inputs and reduction of environmental costs related to waste disposal. The very process of recycling is a part of a broader concept known as the 3R (Reduce-Reuse-Recycle). Secondly, lower storage costs and lower power consumption lead to an increase in productivity of the production process. Thirdly, the waste processing and the use of by-products in the form of the "new" input. Finally, reduction of the opportunity costs related to underutilized resources.

Growth of business efficiency, which is further supported by the increase in quality, results in products that are labelled as "eco-friendly". Such products are fully compatible with the environmental and ecological principles. Usually they are of better quality and are safe to use, which implies value added for customers. Also, growth of quality is often accompanied by lower costs of packaging and product delivery, as well as lower costs of production itself because it uses recycled inputs, which ultimately accelerates efficiency of resource use. Besides that, most available studies emphasize the fact that the "green" markets are now reaching critical mass, displaying high growth rate and should continue to do so in the near future, especially in renewable energies and energy efficiency [11]. A lot of companies are now investing and diversifying more in green activities.

Business models based on the circular economy represent a certain step out for companies and require a strategic approach. Namely, in order to approach the economic and environmental objectives, it is necessary to formulate and implement an environmental strategy for a business, which has to be fully compatible with the corporate strategy as a basic guiding principle of the business.

According to Porter, improving performance in accordance with the environment enables companies to actually achieve competitive advantage and reduce costs. Although the transition to the patterns of production and business favourable to the environment can cause short-term costs, it can also bring long-term benefits, because it creates preconditions for technological leadership in products and processes, which will eventually conquer foreign markets [18, p. 369]. Efficient and productive operations induce growth of the market share of companies, as well as their better rank in the global flows. Finally, the growth of competitiveness and the creation of competitive advantage on that basis keep creating value in the long term.

Bearing in mind the abovementioned, the circular economy is becoming a prerequisite for a long-term sustainable growth of both companies as well as developed

and developing economies. The aforementioned concept is a strategy and sustainable policy for the future, because it facilitates the transition from the so-called conventional linear production model to industrial ecology. In other words, the implementation of the idea of circular economy in modern economic systems provides compatibility of economic and environmental objectives. Economic goals are usually expressed in the form of growth in profitability, growth in market share and the level of value created. Environmental objectives refer to the environmental protection.

On the other hand, new trends and impulses from the global environment accentuate and encourage businesses to use renewable energy sources. Individual business on the basis of alternative sources or pooling of complementary businesses in the form of clusters improves business efficiency and other goals, and represents a direct implementation of the goals of circular economy. In other words, it respects all the principles and postulates of the environment. Accordingly, circular economy, the use of renewable energy sources and the association of companies in the form of clusters are unbreakable links that create the perfect ambience for improving competitiveness and sustainable growth of enterprises and the national economy. In essence, the circular economy and the use of renewable energy sources are parts of the diamond of national competitiveness, which are essential for the development of green clusters as well as the improvement of competitiveness in this respect. Also, some authors are emphasizing the very important interrelationship between regional innovation systems and green clusters, in the sense that these systems are facilitating the emergence of green clusters [1]. On the other hand, the aforementioned relationship creates synergy effects which exceed the challenges of climate change and other environmental issues. The special focus of this paper will be precisely on the mentioned bonds, with an emphasis on the role of green clusters in economies worldwide, their micro and macroeconomic effects, which are highly connected, and it would be unnecessary to consider them separately. Accordingly, the circular economy imposes functioning of the economy and companies in accordance with its principles as the new business imperative, it represents an essential condition for success in global competition and it is also a prerequisite for sustainable long-term growth.

Renewable sources of energy

The new "green" concepts of business are dependent on numerous international treaties, directives and conventions such as the Kyoto Protocol, which was held under the auspices of the United Nations in 1997 [12, p. 424] and the Paris Protocol, which is the result of the conference dedicated to climate change COP 21 in November 2015. These tendencies opted for the world's leading economies to reorient and indicate the use of renewables, and therefore reduce the use of non-renewable energy sources, mainly fossil fuels.

The very name of renewable or alternative energy sources comes from the fact that the rate of utilization of resources does not exceed the rate at which it is produced. There are several types of alternative energy sources, among which:

- hydro energy
- biomass
- solar energy
- wind energy
- energy of high and low tides
- geothermal energy
- biofuels

The use of renewable energy has many advantages. The companies that use them emit less harmful gases (including CO_2), which are considered to be the main cause of ecological problems such as the greenhouse effect and climate changes. Accordingly, there is also a multiplier effect as the increase in utilization of alternative forms of energy stimulates the production of equipment for their use, which further stimulates innovative activity in this area. Furthermore, these sources of energy lead to the decentralization of the energy sector, job creation and entrepreneurship development. The main limitation of renewables is that they do not have the potential to create energy as non-renewable sources, viewed from the aspect of production. Consequently, it would be best to achieve a balanced use of renewable and non-renewable energy sources.

Companies operating within the European Union have incorporated into their strategies the famous principle of "20-20", which means that they will increase the use of renewable energy sources to 20% by 2020, reducing thereby the greenhouse gas emissions by 20% [6]. In 2014, a cumulate, which constitutes 9.1% of total world energy, was obtained from the renewable energy sources, a fact which also represented an increase compared to the year 2013 (8.5%) [10].

Globally, notably increased investment in renewables, with special emphasis on solar and wind energy, was achieved both in developed economies and developing countries. It is very interesting that the amount of investments[1] was approximately the same in 2014 as presented in Figure 2. Also, it is noticeable that developed countries reached the peak of investment in renewable energy sources in 2011 and then made a slight stagnation, while developing economies had a slight and gradual growth of investments over a six-year period (2009-2014).

This statement is significant from the point that many developing economies take advantage of the period of global economic crisis as an opportunity for economic growth, better positioning on the world market and increase in competitiveness in this respect.

According to the data from UNEP (United Nations Environment Programme) for 2014, a table (Table 1) has been made to show the ranking of world economies based on the investments in renewable energy. The value of investment is expressed in billions of dollars.

Table 1: Total investment in renewables in 2014 worldwide

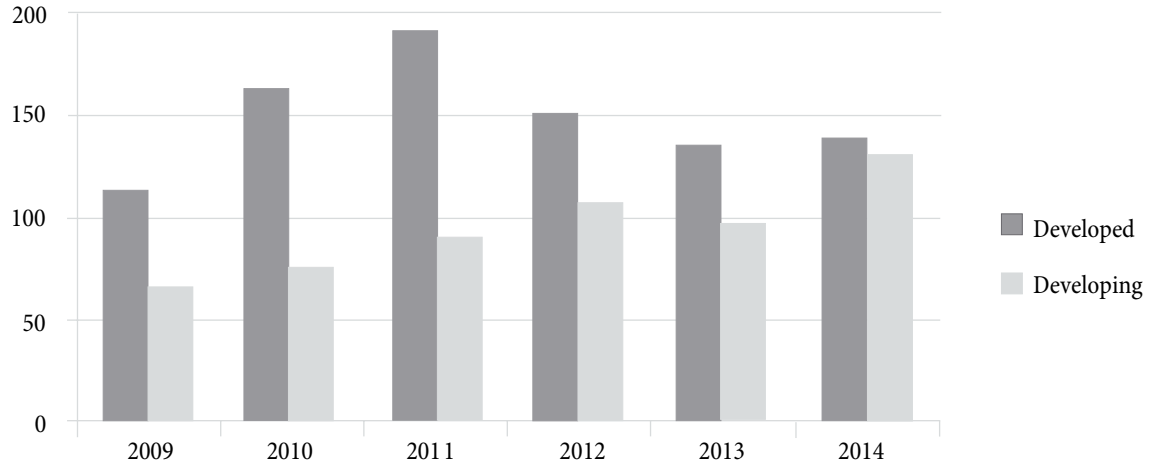
The economies with the largest amount of investment in renewables	Investment value ($BN)
China	83.3
USA	38.3
Japan	35.7
Brazil	7.6
India	7.4
Germany, Netherlands, Italy	7

Source: Authors' illustration

On the other hand, although Serbia ratified the Kyoto Protocol in September 2007 [17, p. 142], and is a signatory of the Paris COP 21, companies use renewable energy sources in a very small percentage. In our economy, the greatest potential and prospects possess biomass with 63%, then solar energy with 17%, the energy of small rivers with 10%, followed by the wind and geothermal energy with 5% [8].

In the period from 2006 to 2015, it was projected that the share of renewable energy in total final consumption would amount to only 2% [9]. The reasons for this practice are often linked to the incentive policy for using these energy sources.[2] The Energy Development Strategy until

Figure 2: Global new investment in renewable energy: Developed vs. developing countries, 2009-2014 ($BN)



Source: according to [10]

1 Developed economies have invested 138.9 billion dollars, while developing countries have invested about 131.3 billion dollars. However, higher growth compared to the previous year was achieved in developing economies.

2 Most European countries apply the system of preferential tariffs, known as *feed-in* tariffs, i.e. the system of minimal purchase price. A good *feed-in* system contributes to the improvement of the competitiveness and liberalization of the energy sector.

2025 with Projections to 2030 [21] and the National Sustainable Development Strategy of the Republic of Serbia [15] predict a much more incentive policy for use of alternative energy sources.

Examples of green clusters: Italy, Netherlands and Serbia

New trends and impulses of the business ambience stimulate the association of companies in the form of clusters. Clusters stimulate innovation and productivity of enterprises that ultimately lead to the increased competitiveness. On the other hand, cooperation between different companies within a cluster makes it possible to compensate for weaknesses and mitigate threats in the business environment, as well as to respond quickly to challenges which ultimately contribute to synergy effects. Clusters contribute to the diffusion of new knowledge, ideas and skills that are the main driver of innovation processes [2]. Keeping this fact in mind, clusters can be drivers of technological innovations that are absolutely necessary for the transition from the linear economic system to the model of industrial ecology, based on the principles of circular economy.

Also, cooperation between enterprises increases critical mass of economic subjects in an economy, which continues to encourage the development of entrepreneurship and provides the necessary support for the development of small and medium-sized enterprises. For an economy, collaboration between different clusters within the economy and the region, i.e. cooperation between domestic and foreign clusters, is of special importance. Finally, clusters are extremely important for the creation and promotion of micro and macro competitive advantage in the long run. The most visible results of the clusters are middle-income and developed economies. Environmental changes reshaped the dynamics in business environment through the constitution of green clusters of innovations and entrepreneurs [11]. The focus of our further analysis will be "green" industry clusters in Italy, the Netherlands and Serbia. The basic purpose of the comparison is to identify future directions for the development of green clusters as one of the potential holders of long-term sustainable growth and energy efficiency in the economy of Serbia.

Case of Italy

The European Union has implemented a variety of principles and directives aimed at preserving the importance of the environment, which induced the development of clusters in this area. One of them is the cluster DIPAR (*Distretto Produttivo dell'Ambiente e del Riutilizzo* – Productive Cluster of Environment and the Reuse) located in the Italian region of Puglia [5]. This green cluster is a collaboration of about 164 companies, 6 universities (University of Salento and Bari) and several public bodies and development agencies. Activities of DIPAR are focused on environmental protection and on emphasizing the importance of the recycling process in the form of reuse of certain resources as a function of sustainable development and energy efficiency. Also, in addition to the local regional operations, the cluster seeks to internationalize activities in the Balkans (Croatia, Serbia and Bosnia and Herzegovina), Middle East, China and Africa.

The internationalization activity is very significant for several reasons. Primarily, it is important because of transfer of technology and expertise, then, because of the possible cooperation with foreign partners and joint appearance on the market. Secondly, it encourages innovative cluster solutions related to the problems of waste, landfills and excessive concentration of pollution in the sense that certain types of waste can be used in the next iteration as the input or missing resource. For example, huge amounts of ash that occur as a side effect of the power plants' activities can be further utilized in the construction of road infrastructure. In this way, the environmental costs are being resolved and reduced, and the potential of industry and other economic sectors, resulting in a larger gross domestic product as well as in reduction of unemployment, are being expanded. This is a good example of how the idea of circular economy is functioning in developed economies.

The diffusion of new ideas and knowledge enables the companies in the cluster to become more productive, more innovative and competitive. Protecting the environment is still a current topic that has great potential of improving the micro and macro-competitiveness. As stated above, significant support for DIPAR cluster is provided by

the local regional government, which is in accordance with the Kyoto Protocol and the principle of "20-20" [6]. Accordingly, the cluster encourages the use of renewables with emphasis on solar energy, hydro potential and biomass. Every year in Bari, international symposia and business forums are held, as last year's Alterenergy, with the aim of informing, educating and promoting new ideas as drivers of innovation, clean technologies and the expansion of the boundaries of clusters in the form of new companies as partners. The aforementioned cluster announced the cooperation with certain municipalities in Serbia such as Lazarevac, Ub, Obrenovac, Lajkovac, Novi Sad, which will contribute to the improvement of the poor environmental image, as well as to the energy-efficient operation of domestic companies.

In the Italian economy, technological SPRING (Sustainable Processes and Resources for Innovation and National Growth) cluster is also very important [4]. This cluster brings together large industrial companies, small and medium enterprises in the sector of the chemical industry, as well as development agencies from eight Italian regions: Basilicata, Piedmont, Veneto, Umbria, Sardinia, Puglia, Lombardy and Emilia Romagna, which further confirms the importance of this cluster for the Italian economy. Multiple connections and collaboration between companies within the cluster produced synergy effects in the form of better positioning of the company in the market, and increase of production and productivity, which ultimately contributed to SPRING becoming a technological cluster with significant performance.

National Technological cluster has great support of the Italian Ministry of Education, Universities and Research, as well as universities from these regions that provide support in the form of subsidies for research and innovation processes and the diffusion of new knowledge. The main objectives of SPRING are generally to increase energy efficiency, to make greater use of renewables as raw materials, with emphasis on biomass, as well as to develop products that will fully be made of alternative sources in order to create greater value for consumers. Cooperation between companies along the value chain contributes to improving the competitiveness and sustainable growth of the region and the whole economy. Business strategy and cluster goals are in accordance with the Horizon 2020 (program of the European Union for research and innovation in the period 2014-2020).

Case of the Netherlands

One of the most important examples of successful green clusters in the global economy is the cluster Royal FloraHolland. Netherlands is the leader with a dominant market share in the production of flowers. In support of this argument goes the fact that the participation of the Netherlands in the world export of flowers is around 52%, while a distant second place is occupied by Columbia (11%), followed by Kenya and Ecuador [19]. The total value of the world trade flowers in 2009 amounted to about $30 billion with projected growth trend of 1% per year and 170 million consumers, which further confirms the size of this market. In 2015, total value of Royal Flora cluster export was €5,557 million with annual growth rate of 3.4%. So far, the Netherlands remains the largest player with a 52% in global exports of flowers and plants.

Pioneer producers of flowers have appeared in the 17th century in the Netherlands, but twenty years ago collaboration and networking among companies started and formed Flora cluster. The cluster consists of manufacturers, suppliers, logistics channels and universities from the surroundings of Amsterdam, Rotterdam and The Hague.

An interesting point in the analysis of clusters represents the fact that the Netherlands has become the leader despite the lack of basic resources (land and adequate climate) necessary for the production of flowers. Although it sounds paradoxical, this economy managed to turn the lack of comparative advantage, essential for the production of flowers, into a sustainable competitive advantage. The ongoing implementation of innovative processes within the entire value chain, as well as the use of specialized technology, annulled the potential threats and weaknesses and enabled greater productivity and competitiveness. Also, cooperation with institutions such as the Dutch Flower Council and the Association of Dutch Flower Growers contributed to improving the performance of clusters through continual research and application of new solutions. Logistics infrastructure and channels

contributed to strengthening the competitiveness of this cluster globally, by lowering transportation costs. Seen from the point of Porter's diamond of competitiveness, mentioned factors are important determinants of the success of an economy. This is of crucial importance, bearing in mind the position of the Netherlands in world exports.

For the past ten years, Flora cluster has been using renewable energy sources in its production, mainly biomass and wind energy, and it has been implementing new technological solutions aimed at reduction of the use of fossil fuels and CO2 emissions, which will also reduce the overall energy demand by 65% until 2020 [3]. In support of this conclusion goes the fact that in the last five years the Netherlands had the highest amount of investment in renewable energy in comparison with all the European economies. Also, mentioned innovation was related to the way in which flowers are grown[3], which further reduced environmental costs of companies in the cluster and of economy as well.

Lower costs, better product quality, higher productivity and more efficient production technologies made excellent results in the world market. In the Netherlands, very strong cooperation between different clusters as well as intersectoral cooperation further contribute to the synergy effects and diffusion of new knowledge. Respect of the EU environmental legislation and strict national standards influenced the creation of new sources of competitiveness of the Dutch economy. Green innovation and improvement of the environment along the existing productive and efficient manufacturing have enabled the achievement of sustainable competitive advantages of the domestic economy.

About 90% of the total cluster production of flowers is exported to Germany, France, Denmark, Finland, Hungary and Slovenia. Also, the cluster sells its products to the markets of the Middle East, South America, East Africa, India and Russia. In this way, it gives full contribution to the growth of export of the Netherlands and GDP growth.

3 Instead of a conventional cultivation of flowers in the country, due to the use of herbicides and pesticides which affected the degradation of soil, flowers are now grown in water and on special wool, which is lowering manipulative costs.

Case of Serbia

Clusters and cluster policy are in the early stages of development in the Republic of Serbia. Most of the clusters were established in 2005 and are now in the early stages of development. In 2005, the Government of the Republic of Serbia with the Ministry of Economy and Regional Development launched an initiative to encourage the process of association of small and medium-sized enterprises in the form of clusters in order to improve the business and national competitiveness and strengthen entrepreneurship.

Following the example of developed economies in the world (USA, Germany, Italy, etc.), the Government of the Republic of Serbia has adopted a program to support the development of clusters, and appointed the Ministry of Economy and Regional Development as a main entity to conduct the cluster policy. The realization of that program began in 2007 with the financial support of the Government of the Kingdom of Norway. In the meantime, the Council for Clusters and Cluster House were established, which, through mapping and informing of clusters, represent their interests and promote them in the best way [16]. Also, National Agency for Regional Development supports networking and enterprise collaboration in the form of clusters.

The Cluster Council is a consultative structure body of the Serbian Chamber of Commerce and a unique advisory body for the development of clusters. The Council was established in 2011 and has two main objectives [13]:

1. The promotion of clusters aimed at enhancing entrepreneurship and general business environment.
2. Initiation of the establishment of new clusters and contribution to the development of individual clusters.

Members of the Council are representatives of cluster organizations in Serbia. Besides the Council, the Cluster House was established in 2011 as well, with technical and financial support from the Danish Programme for Local Economic Development – LEDIB. The Cluster House established the innovative training centre for cluster development based in Niš in 2012, in order to further encourage and support the development of clusters. It has also developed a unique magazine for clusters in Serbia, Infocluster, and set up the annual Balkan Conference

"Cluster days" in Niš. All these data indicate the fact that the clusters in Serbia are seen as one of the pillars of the future development of domestic economy. All of these activities in the field of clusters are in accordance with the Strategy for Competitive and Innovative SMEs 2008-2013, as well with the actual Strategy for Support and Development of Small and Medium Enterprises, Entrepreneurship and Competitiveness for the period 2015-2020.

In Serbia, there are currently 40 clusters; few of them are national, while others are regional. If we focus on the link between clusters and economy sectors, tourism is leading with 6 clusters followed by construction with 5 clusters. Besides them, there are also clusters in textile, agriculture and food production sector. In addition, there are information technology clusters, service cluster, scientific cluster and three ecological (green) clusters which are dedicated to recycling and energy efficiency: Green Building Cluster (in Serbian *Klaster zelene gradnje*), Recycling Cluster South (in Serbian *Klaster Reciklaža Jug*) and cluster Ecopanonia. [14]. The first two clusters are in the region of Southern Serbia, while the third one is based in Vojvodina.

The common features of all three green clusters are the same goals and ecological achievement, such as the growth of energy efficiency, greater usage of renewables, implementation of the European standards, improvement of the "green" performance of companies, as well as continual education and information and spreading of awareness about the importance of environmental protection through various projects, fairs and workshops. Also, clusters tend to engage many universities, development institutions and interested investors in their work. The aforementioned clusters are in the initial stages of development and they currently do not have concrete results in terms of production, exports, reduction of unemployment rate or activities in foreign markets. Nevertheless, green clusters have great potential and prospects that can be achieved with the necessary financial support from the government and foreign funding, and also with the expansion of relationships within clusters, as well as between domestic and foreign clusters.

Green Building Cluster promotes the idea of construction, general planning and design that is energy efficient. It was founded in 2011 in Niš. In addition to construction companies, members of this cluster are three faculties: Civil Engineering and Architecture, Mechanical Engineering and the Faculty of Economics in Niš, Department of City Planning, Engineering Chamber, Chamber of Commerce of Niš, as well as local municipality. The main objective of this cluster is to encourage the construction of the so-called "smart" buildings and other facilities. Consequently, Green Building Cluster aims at increasing the participation of recycled waste in the production of building materials, which is also one of the basic ideas of circular economy. The second objective is related to the greater use of renewable energy sources. In the future, the cluster will seek to expand cooperation with the investors, manufacturers and suppliers of construction materials in order to increase the value added within the value chain and to improve the performance of the cluster. As mentioned above, it is necessary to cooperate with other complementary clusters in order to increase the competitiveness of the domestic economy.

Recycling Cluster South was founded in 2010 by private companies from South-East Serbia. Like the previous cluster, it also includes universities and the regional Chamber of Commerce. The mission of the cluster is to achieve the objectives and to strengthen regional cooperation in the field of environmental protection and sustainable development by integrating the activities of business entities that deal with waste management and recycling. Unlike the previous cluster, which is focused on improving energy efficiency through a "smart" construction, Recycling cluster "South" emphasizes the importance of recycling for one economy. Accordingly, Recycling Cluster South promotes the aforementioned idea of 3R (Reduce-Reuse-Recycle). The specific objectives of the cluster are related to waste management: reduction of the amount, flow control and maximum utilization of the same value as the new inputs in order to achieve more favourable impact on the environment. Recycling Cluster South promotes entrepreneurial spirit and encourages the networking of small enterprises in the cluster. Apart from that, the expansion of a network of recycling centres and landfills has also been announced, in order to minimize the high environmental costs caused by waste.

Cluster Ecopanonia was founded in 2011 in Novi Sad. As in the case of the aforementioned clusters, Ecopanonia aims to protect the environment, to make the optimal use of renewables, to strengthen the intra-regional and inter-regional economic competitiveness and to improve the quality of life. Apart from the educational, informational and research roles, the cluster seeks to enhance innovation centres as well as to improve the production of solar panels, biomass, pellets, briquettes and production of electrical and thermal energy on that basis. Members of the Cluster are 36 local and foreign companies, universities and institutions. Ecopanonia is the first green cluster in Serbia that included three companies from Hungary engaged in the manufacture of products from alternative energy sources (biomass, biogas, geothermal) – Mvm Wrapped, EMB, EU Fire. Cooperation with Hungarian companies is a good example of collaboration of companies in the region, which is very important in terms of knowledge and experience that come from an economy that has successfully completed the transition process and is also a member of the European Union. In addition to these three companies, the cluster includes companies such as Koning, Record Erdeš, Alma Mons, and the Faculty of Engineering and Environmental Engineering as REECO – organizer of conferences and exhibitions on environmental protection.

Conclusion

The main goal and focus of this paper was to outline a new way for the improvement of the national competitiveness and the competitiveness of local companies through the establishment and development of green clusters. Besides the fact that clusters give the best results in terms of improving competitiveness in the middle-income and developed economies, some foreign solutions and experiences could be applied in the domestic economy. The consequences would be more than desirable: energy efficient operations could reduce operating costs. On the other hand, clusters as holders of innovation processes, can create a presumption of production that is more competitive and productive; such products would have the prospect of a successful placement on the demanding European market, which would contribute to the increase of exports and reduction of the current account deficit. Export growth induces growth of gross domestic product and living standards as the main indicators of economic growth and activity of an economy.

Although the European Commission projected growth of the domestic economy round 2% for the year 2016, this rate is still below 4% – below the rate that ensures sustainable economic growth [7]. This fact should not be discouraging, as it suggests two things: first, that the domestic economy emerges from recession, and that there are signs of economic recovery; second, that there is a place for improvement of company and economy performance that can be achieved in different ways and, most importantly, that it is not unattainable. Therefore, cluster policy, in combination with environmental policy, should be an integral and important part of the economic policy of one country. The implementation of the same should encourage cooperation between local companies, as well as partnerships with foreign clusters.

Clusters, and especially green clusters, are organic, i.e. natural way to enhance growth. Cluster development affects other sectors in a synergic manner because, e. g. they encourage the development of civil engineering, traffic infrastructure, as well as tourism. In addition, a positive impact on the development of entrepreneurship and small business development of the analyzed sector is more than obvious.

Green clusters are bringing together often divergent economic and environmental objectives of each economy. As such, they are operating in accordance with the principles of circular economy through the use of renewable energy and recycled materials while improving competitiveness, innovation and productivity of enterprises and economies. Circular economy and the use of alternative sources of energy are inseparable links and significant determinants of the Porter's diamond of competitiveness. This process is not unidirectional. Precisely green clusters can be one of the pillars of technological innovations that are necessary to replace the linear economy with circular economy. On the other hand, the diffusion of new knowledge and skills within the cluster opens up opportunities for differentiating products and services, as well as the emergence of entirely new products, which further supports the fact that green clusters have

great potential to create long-term competitive advantages. In accordance with the abovementioned, we can conclude that green clusters provide a good basis for the development of knowledge-based economy that is growing sustainably.

References

1. Berg, S. H., & Hassink, R. (2012). Emerging green clusters in South Korea? The case of the wind power cluster in Jeonbuk province. *STI Policy Review, 3(1),* 63-79.
2. Bošković, G., & Jovanović, A. (2009). Uticaj klastera na konkurentnost i regionalni razvoj industrije. *Ekonomske teme, 47,* 107-119.
3. Case studies of clustering effort in Europe: Analyses for their potential for promoting innovation competitiveness. Europe INNOVA. Retrieved from http://www.utb.cz/file/21763_1_1, accessed 5/30/2016
4. Cluster Spring. Retrieved from http://www.clusterspring.it, accessed 6/4/2016
5. DIPAR. Retrieved from http://www.dipar.eu, accessed 6/18/2015
6. Đereg, N., Jović, Z., & Apostol, I. (2014). *Obnovljivi izvori energije u Srbiji (preporuke, potencijali i kriterijumi).* Subotica: Centar za ekologiju i održivi razvoj.
7. Đuričin, D., & Vukasanović, I. (2016). The future of Serbia and how to survive it: Catching up and convergence with the EU. *Ekonomika preduzeća, 64,* 15-36.
8. Efikasnost. Retrieved from http:// www.efikasnost.rs, accessed 4/15/2015
9. Elektroprivreda Srbije. Retrieved from http://www.eps.rs, accessed 4/15/2015
10. Global trends in renewable energy investment 2015. FS-UNEP Collaboration Centre. Retrieved from http://fs-unep-centre.org, accessed 4/10/2016
11. Hamdouch, A., & Depret, M. H. (2012). Green entrepreneurship networks and clusters: When the local requires the global?, *RSA Global Conference 2012*, Beijing, China.
12. Harris, J. M. (2009). *Ekonomija životne sredine i prirodnih resursa*. Beograd: Data status.
13. Kaličanin, Đ., & Gavrić, O. (2014). The importance of clusters as drivers of competitive advantage of companies. *Ekonomika preduzeća, 62,* 164-172.
14. Katalog klastera. (2014). Beograd: Privredna komora Srbije.
15. Nacionalna strategija održivog razvoja. Službeni glasnik Republike Srbije br. 57/2008.
16. Parušević, V., & Cvijanović, D. (2006). Značaj i uloga klastera u identifikaciji izvora konkurentnosti agrarnog sektora Srbije. *Industrija, 1-2*, 81-90.
17. Pešić, R. (2012). *Ekonomika životne sredine i prirodnih resursa*. Beograd: Zavod za udžbenike.
18. Porter, M. (2008). *O konkurenciji*. Beograd: Fakultet za ekonomiju, finansije i administraciju.
19. Porter, M., Ramirez-Vallejo, J., & Van Eenennaam, F. (2011). *The Dutch Flower Cluster.* Harvard Business School Case, Boston.
20. SOER 2015. The European environment – state and outlook 2015: synthesis report. Retrieved from http://www.eea.europa.eu/soer
21. Strategija razvoja energetike do 2025. godine sa projekcijama do 2030. Godine. Službeni glasnik Republike Srbije br.101/2015.

Olga Gavrić

is Teaching Assistant at the Faculty of Agriculture – Department of Economics, University of Belgrade. She received her Bachelor's and Master's degree from the Faculty of Economics, University of Belgrade. Currently, she is a PhD student in Business Management at the same University. She is the author of articles in national scientific journals. Her fields of interest refer to strategic management, value creation, competitiveness analysis and environmental management.

Đorđe Kaličanin

is Associate Professor at the Faculty of Economics – University of Belgrade, where he earned all his degrees (BSc, MSc and PhD) and where he teaches a course in Strategic Management. In the master's degree program, he teaches courses in Strategic Finance, Business Strategy and Managerial Decision Making. He is co-author of the university textbook *Menadžment i strategija* (Management and Strategy) and author of the book *Menadžment vrednosti preduzeća* (Managing the Value of Companies). He is also author of articles in the scientific fields of strategic management, business planning, value-based management and performance measurement systems.