Nenad Popović
ABS Elektro

THE NEW INDUSTRIALIZATION OF SERBIAN ECONOMY

Nova industrijalizacija srpske privrede

Abstract

The aim of this paper is to emphasize the necessity of reindustrialization of the Serbian economy. In order to ensure the preservation of the economy in terms of substantially altered external environment, first of all, it is necessary to consolidate the existing state and to ensure the growth of industrial production. This can be achieved by focusing resources primarily on the following industries: petrochemical, agro-industry, automotive industry, textile industry, and building materials industry. However, to ensure long-term sustainability of the Serbian economy, as soon as an acceptable level of growth in industrial production is reached, it will be necessary to enter the next phase – development of the Serbian industry based on knowledge and modern technologies.

Key words: *industry, reindustrialization, knowledge-based economy*

Sažetak

Cilj ovog rada je da ukaže na neophodnost reindustrijalizacije srpske privrede. Da bi se obezbedilo očuvanje privrede u uslovima bitno izmenjenog eksternog okruženja, najpre je potrebno konsolidovati postojeće stanje i obezbediti rast industrijske proizvodnje. To se može ostvariti fokusiranjem resursa, pre svega, na sledeće grane industrije: petrohemijska, agroindustrija, automobilska industrija, tekstilna industrija i industrija građevinskih materijala. Međutim, da bi se obezbedila dugoročna održivost srpske privrede, neophodno je, nakon dostizanja prihvatljivog nivoa rasta industrijske proizvodnje, ući u sledeću fazu – razvoj srpske industrije baziran na znanju i savremenim tehnologijama.

Ključne reči: *industrija, reindustrijalizacija, ekonomija zasnovana na znanju*

Introduction

Turbulent changes that have swept the world at the beginning of XXI century have particularly affected the economic flows of developed countries which are characterized by intensive development processes and cooptation (cooperative competition). On the contrary, the economic system of Serbia entered the second phase of the transition process considerably weakened due to a number of adverse events that have marked the last decade of the 20th century.

A large decline in industrial production in the 1990s was not recovered in the past decade, but has stagnated at a very low level. Serbia lost significant infrastructure, human and technological resources, which has reflected on the existing industrial system that is fragmented and dysfunctional. At the same time our industry is far behind compared to most countries in transition and developing countries that at times adopted a new paradigm of development and through the implementation of reindustrialization process gave to the industry a key role in the overall economic development. A present state of the industry in Serbia does not only disable economic development, but the overall social prosperity of the country as well.

Thus, special priority must be given to adopting an industrial policy that would enable the realization of the process of industrial structure transformation in line with changes in the environment (global competition, changing customer expectations, technological discontinuities, transformation of information and knowledge into the key economic resources, environmental concerns, etc.), through an in-depth review of the current situation, and considering the specifics of our industrial system. With respect to the aforementioned, some guidelines are given in this paper. In the first part, we will analyze the performance of the industrial system of Serbia over the past decade in order to recognize the essence of the current situation. Then, it will be identified industries that have the most potential to achieve significant growth in the medium term. Finally, it will be pointed out the necessity of improving industrial branches by adopting new concepts of industrial development based on knowledge and innovation.

Overview of the industrial sector in Serbia

Serbia's GDP grew at an average rate of 4% per year from 2001 to 2009 [4] and [5], while in 2010 recorded growth of 1% compared to the recessive 2009 [4] and [5]. The service sector has contributed most to this relatively dynamic growth of the gross domestic product in the second phase of the transition process. However, by pushing the development of the service sector, traditionally and predominantly oriented to the domestic market, the development of the real sector has been completely neglected, which had significant impact on the change in the structure of the economy.

The share of industrial production in GDP creation dropped from 21.7% in 2001 to 15.9% in 2010 (processing industry accounted for only 13.7%), which resulted in deformation of the economic structure. In the period from 2001 to 2009, the average rate of decline in GVA of industrial sector was about -0.1% (-0.4% of processing industry), with a marginal negative contribution to GDP growth [4] and [5]. Therefore the share of tradable goods sector has been low in GDP structure formation (25.2% in 2009). However, the gap between the sector of tradable

and non-tradable goods further deepened in 2010, which hinders the improvement of export performance [4] and [5].

In the period 2001-2009, the average growth rate of industrial production amounted to only 0.5% [4] and [5]. The whole transitional cumulative growth of the Serbian processing industry from 2001 to 2008, which amounted to 18.6%, was annulled (-18.7%) during the crisis of 2009 [3]. After a significant drop in 2009, the industry sector in 2010 recorded a slight recovery. In 2010, there was a growth in GVA of the total industry in amount of 2.2% (processing industry by 3.4%) [4] and [5]. Despite this, the recorded volume of industrial production in 2010 accounted for only 45.9% of the volume in 1990, with cumulative growth of negligible 2.5% in the last two decades (Figure 1) [6]. According to the estimates for 2011, total industrial production recorded a modest positive growth (overall industry growth was 2.1% after eleven months), primarily due to electric power and mining [1]. However, the data for processing industry in 2011 will be lower than in 2010. A sharp downward trend in processing industry, which makes more than 70% of Serbian industry, and significant negative results are reported monthly from April 2011 [1].

The number of industrial workers has dropped from nearly one million, as it was in 1989, to only 312,000 in 2010 (Figure 1) [6]. Number of workers employed in the processing industry halved in the period 2001-2009 (decrease of 47%), which is the one of the biggest economic transformations of all transition countries in the region [3]. Hereby the industrial system is not lost only in quantitative terms of the human potential, but also in qualitative – keeping in mind its ability to successfully manage and innovate its own business systems in such a way as to make them more competitive in the global market. One of the reasons that has largely contributed to this situation is the low levels of investment in human resources, research and technological development which are the basis for economic development – the budget allocated for education is approximately 4.5% of GDP, while about 0.3% is provided for science, but more than 90% of these expenditures go to salaries of employees in these sectors [4] and [5].

A particular problem is that the Serbian industry in terms of technology is far behind not only in comparison

with the leading world and European economy, but also in comparison with the technological level that it had until 1990 [4] and [5]. Companies from the sectors with low technological intensity (47%) and medium-low technological intensity [4] and [5] dominate in the structure of the processing industry [4] and [5]. More than 90% of industrial companies are located in LMT sectors, and they employ(ed) over 90% of industrial workers (2008) [6]. This situation has very negative implications for the qualifications of the industrial workers, which creates an unfavorable demand in the labor market for highly qualified workers [6]. A share of high and medium-high technologies, which are the engine of industrial development and an essential component of long-term stability and independence, is very small in the Serbian industry [4] and [5]. This has a very negative effect on the structure of Serbian exports (over 95% of Serbian exports come from the industry), which are predominantly based on primary products (34.5% in 2009) [4] and [5], instead of the high value-added products and those of higher level of finalization.

These indicators clearly show that in recent times Serbia is not stagnant primarily due to the impact of the global economic crisis, but because of its own autochthonous crisis caused by internal factors, which started much earlier. The devastation of industry in the last two decades has led to silent death of the traditional industrial centers in Serbia and massive unemployment.

Due to the systematic destruction and degradation of internal resources (human resources, infrastructure, production programs), in terms of development, the Serbian industry tends to vacuum state. In addition to growing economic crisis in the country, external shocks such as financial, economic or debt crisis are further deteriorating economic situation. The key problem is that the governance of industrial system of Serbia is completely reduced to the economic level, focusing only on one aspect – how to attract foreign direct investment, and ignoring entirely other, equally important factors such as technology and human resources [6].

The current crisis that has engulfed the peripheral countries of euro zone, has revealed that the prerequisite for a steady growth of the state is a sound economy, founded on developed industry. To ensure the sustainability of the economic system of Serbia, it is necessary to consolidate the industry and bring it back to functional state through the proper selection of branches that have the most potential to provide needed growth in the medium term. The aim of diversifying the economy and creating new sources of growth must become a part of economic development programs and strategic documents the implementation of which will be a priority. This includes efforts to increase the competitiveness of selected branches of industry by improving the technological base and human resources. The economy based on knowledge and innovation must be built for the benefit of all citizens.

Figure 1: Comparative view of aggregate indicators of Serbian industry in the period 1960-2010 [6]

The new industrialization as the basis of the development cycle

As shown in the previous chapter, Serbia has in the past decade implemented an absolutely inadequate model of economic development based on the inflow of foreign capital and on a highly dynamic development of the service sector. The development of the real sector, i.e. the existing industry and agriculture, has been neglected. This in turn has resulted in a malformation of the economic structure, hence, Serbia has already experienced a fall in the GDP growth rate, a high and an ever-rising unemployment rate, a deficit in the foreign trade, and also a high and increasing external debt which is impossible to control without a prior change in the foreign trade orientation. Consequently, the future development of Serbia depends on a reindustrialization oriented towards the goals to be achieved on export markets, in which the parties will play an important, however not critical, role in the industrial production growth. The depth of identified macroeconomic problems is multiplied by the effects of the economic crisis, especially its second wave, when the possibilities for reactive microeconomic strategies are exhausted, which further proves that time is one of the crucial variables in the future success formula.

The linear and non-transparent policy of incentives implemented so far has shown that no strategy of creating new industry has been formed, and that the first step in its adoption involves the identification of the key sectors of the future industry of Serbia. The industry policy support has to be oriented primarily towards concrete activities, segments, and even products that will help increase production and exports, and raise the employment rate in the shortest possible term, i.e., towards the industries that dispose of certain capacities and technological level that already guarantee competitive advantage on the existing markets. The most important in this view are the agriculture and food processing industry, chemical industry, petrochemical industry, and textile and shoemaking industry sectors. In the medium term, it is necessary to adopt the measures that could improve international competitiveness of the sectors that have new products and/or can capture new markets. These requirements can be met by the energy supply sector, the metal sectors (especially automotive

industry), the construction industry, and the recycling industry. In the long run, the potentials for growth in the domain of telecommunications, bioengineering and “green energy” should be exploited. In the second phase, upon three to five years, reindustrialization should be characterized by the transition from manufacturing labor-intensive products (with a lower share of added value in the product price) to technologically-intensive products, and thus preventing the situation in which the production of industrial products increases, however, without the change in the added value this sector creates, having in mind that a further fall in the prices of labor-intensive products is expected in the years to come. If the policy of randomly supporting every foreign investor who wants to come to Serbia and only certain national investors continues, the result will again be an inadequate allocation of resources with no long-term prospects to create conditions for an endogenous growth and therefore, the economic growth of Serbia will depend again on foreign investments.

Agriculture and food-processing industry sector. Serbia is unfortunately still an agricultural country, which is shown by the statistics of the products of agricultural origin dominant in the production (over 24%) and exports (over 28%). There is no reason to be satisfied with the achieved, seeing that the Serbian exports per hectare of arable land are twice as low by comparison with the exports of the Macedonian agriculture, the difference being even more striking by comparison with Croatia. Besides, the year 2014 will be characterized by an overall liberalization of agricultural and food products trade with the European Union, and the Serbian agriculture is not yet ready for the conditions of fierce European competition, not even on the national market.

A survey of the agricultural statistics reveals that meat and meat products are barely included in the exports, nor are milk and dairy products. In the period from October 2010 until April 2011, Serbia exported 1.5 million tons of corn, and imported 7 thousand tons of pork meat, an indicator of the presence of significant limiting factors of further growth in the very structure of the agricultural sector. The policy of subsidies to agriculture implemented in the past four years has significantly contributed to the exports statistics remaining unchanged. Out of the

total of the subsidies paid, around 80% is allocated to crop farming, out of which as much as 37 % consisted of the incentives to livestock farming in the period before 2008. In the past decade, all the average annual values of production in livestock farming have been lower (fattening pigs by 36.6%, eggs by 28.9%, beef by 25.5%, pork by 24.4%, mutton by 11.2% and poultry by 31.7%). Another problem is the size of the budget that has for years stagnated or decreased, and has been distributed unequally, to an ever decreasing number of farms.

Serbia should produce and export the higher-phase processing products, branded products, processed in accordance to both traditional and modern technologies that ensure high quality and a share on the markets characterized by a higher purchasing power of ultimate consumers. Since livestock farming is by its nature a higher processing phase in comparison with crop farming, and since industrial herbs, fruit and vegetables make the basis for an accelerated development of the food-processing industry, the need for change in the domain of subsidies allocation is evident. In the domain of crop farming, it is necessary to introduce subsidies what will ensure the link to be created between the yield and subsidies in order to motivate producers to implement modern methods in the primary crop farming. It is also important to introduce differential subsidies for the producers of industrial herbs, fruit, and vegetables, as well as to gradually increase subsidies in livestock farming to the level of 50% of the total agrarian budget. This would be a significant incentive to the employment rate growth in this sector, given a higher labor intensity of these activities in comparison to crop farming. The flippancy in the approach to agriculture is further highlighted by the fact that last year Serbia exported USD 528 million worth of fruit and vegetables, with no secured differential subsidies for the production of these cultures, normally paid to producers throughout Europe.

On the basis of the above-mentioned a conclusion can be drawn that in a medium-term period the most important for the further growth in this sector is to improve the situation in the food-processing industry. The structure and the level of technical and technological equipment in the food-processing industry sector in Serbia is on the level that does not make the growth factor a limiting one

in agriculture and its restructuring. A relatively low level of capacity exploitation is constantly evident, both in the overall industry of agricultural produce processing and in its aspects individually. So, for example, the oil mills employ as much as 60% of their capacities, sugar mills employ around 30%, the confectionery industry employs 40%, meat packing plants exploit 35% of their capacities, the fodder processing industry employs 15% of its capacity. The subsidies to the exports of end products of these producers could simultaneously result in the growth in the demand and the higher prices in purchases from the producers, which would further enhance the primary production. In such conditions, the agricultural exports could be expected to rise by 50% in three years, and even to double in five years.

Energy supply industry. Investments into power engineering make one of the key priorities in creating infrastructure conditions for investing in other economic sectors, since no economy can expect a significant economic growth based on the growth of commodity production and investments without having at disposal available economic energy capacities. The share of the energy supply sector in the Serbian GDP amounts to over 7.5%, the sector employs over 80 thousand people, increases the foreign trade deficit by more than USD 30 billion, and the total investments in the sector, even in the present conditions, exceed EUR 500 million annually. The last construction works in the energy sector in Serbia date back to 1989, when the “Drmno” power plant was completed. These facts only point out that any further delay in planned investments in the energy supply sector on the basis of the Strategy of the Energy Supply Development of the Republic of Serbia until 2015 will endanger energy safety and also the future of the Serbian economy [9].

Investments into energy sector required to be made in Serbia will induce technological improvement, that is, the urge to implement the R&D results to reduce energy intensity. Empirical studies prove that the increase in prices of energy resources up to the market level will not result in the fall of the GDP in case there is enough available capital to implement necessary technological changes in the thermodynamic conversion that result in energy efficiency. Institutional economists suggest that

the key role of policy makers is to provide subsidies to investments and an environment that ensures a long-term orientation of participants in the market. In the case of Serbia, this means creating an economically sustainable business model as well as attracting investments of public and private companies in the energy sector. The plan of investments into the energy sector should also be adjusted to the principles of energy safety, which in turn should be adopted as a Pareto optimum between the demands to reduce energy dependence and technical, economic, political, and environmental risks. A number of facts corroborate the statement that investments into the energy sector of Serbia will produce a manifold favorable benefit for the future economic growth. Firstly, the planned investments in the energy sector are based on the domestic finance sources, on condition that realistic prices of energy resources are secured. Secondly, in the South Stream project, as well as in the projects on the construction of the thermal power plants, regulations are provided as to the maximum (or minimum) engagement of the national construction industry and suppliers, which should both directly and indirectly employ at least 50 thousand workers. Thirdly, the South Stream project will earn revenues from transport taxes in the amount of at least EUR 500 million annually, while the imports of electric power will be replaced by the exports of this power worth EUR 300 million annually, on average. Fourthly, the planned investments worth around EUR 15 billion should be finalized by 2017, which would ensure a higher than 25% total rise in investments in the years to come as well as projects for the national companies worth half of the sum, and the effects upon the completion would be visible both in foreign trade and in the rise in investments in related branches and industries based on energy resources consumption.

Petrochemical sector. The past decade is predominantly characterized by a business collapse and a definite closing down of a number of domestic producers of petrochemical derivatives of a higher processing phase (ZORKA, Šabac; VISKOZA, Loznica; ŽUPA, Kruševac; IHP, Prahovo; HIPOL, Odžaci) [10], and finally, in 2009, the “cornerstones” of the Serbian petrochemistry – HIP PETROHEMIJA, HIP AZOTARA and MSK. After so many years of transition we are still at the beginning, as the state is still, directly

or indirectly, the majority owner of all the companies; the capacities are totally or mostly depreciated, whereas the production program still remains unchanged. Over four thousand employees and the entire basis of the Serbian chemical industry are endangered due to being neglected for a large number of years. Even in this condition, this sector enables Serbia to be included in the chemical industry of the region with over USD 250 million worth of exports. In three years, with the investments that do not exceed this amount, it is possible to double the scope of production and exports and to activate a number of new as well as some of long closed capacities. The optimism in the development plans for this sector is based on the change in the ownership relations in the petroleum sector and the announcement of the beginnings of the South Stream project execution towards the end of the current year, which brings closer the time of parity optimum price relationship between the input and output products in the petrochemical sector.

The reasons for a more intensive participation of the state in this sector are numerous. The profitability of the petrochemical business is sinusoidal, with cycles lasting 7 to 9 years. Given that 13 years have passed since the last maximum in the prosperity of this sector, it is with great certainty that we can say that a growth in the profitability of this sector is expected in a short time; however, the Serbian companies are neither organizationally nor technologically, nor financially prepared for it. Due to a high share of fixed costs, the production units in Europe, of the size similar to the existing ones in Serbia, will face a number of problems considering the competitiveness of their primary petrochemical derivatives. The result is that today the European petrochemical companies generally resort to an internal valorization of their primary derivatives through the development of capacities for the production of a wide range of much more accumulative higher order derivatives, offering their own ethylene, propylene, methanol or aromatics on the “spot” market only sporadically, in cases of unplanned slowdowns in their own higher-finishing phase production plants. Due to all these, and also due to an already dramatic rise in the consumption of the PR in China, in India, and in the Russian Federation, there are still significant opportunities for the survival and

growth of the placement of the petrochemical complex of Serbia on the regional market. The alternative to the state investments for the purpose of preserving the capacities of the basic chemistry is an intensification of efforts in connecting the national companies with strategic partners within marketing-technological alliances, with “large” corporations that would invest into the development in order to get the opportunity to enter the regional market of higher-processing phase derivatives.

Automotive industry. The production in the world automotive industry is highly concentrated, which is supported by the fact that as much as 77% of world production is covered by only 10 companies. The European manufacturers outsourced over 75% of their production to component producers such as Bosch, Valeo, Faurecia, and Siemens VDO. Even in the crisis conditions, the fall in this industry is not that dramatic and certain countries even record a growth. A possible prosperity of this industry in Serbia is enhanced by a joint business venture with the Italian Fiat. The restructuring of the plant of the former automobile factory Zastava, as well as the construction of the new business premises of Fiat and the component suppliers Magneti Marelli, Johnson Controls, Promo Magneti, Seajet and HTL are close to completion. The estimates on the final manufacturing and export effects of this project are still in the domain of forecasts, nevertheless, significant amounts of money invested will by all means foster the Serbian exports as well as the technological level of the automotive industry. On the other hand, to achieve at least a portion of a success whose benefits are now enjoyed by the employees in the automotive industries of Slovakia, the Czech Republic, Hungary, and Poland seems rather necessary than possible. It is also vital to attract other manufacturers of automobiles and components. The reverse order of things is more probable, however, equally desirable from the point of view of the development effects. The production of auto components in Slovakia makes around 50 percent of the total income of their automotive industry and has increased 11-fold over the last ten years, now earning around EUR 9 billion annually [11]. The differences in the labor costs between the countries with developed automotive industries and Serbia are not enough to ensure a favorable result, since

there are also differences in productivity, level of industrial knowledge and education system that Serbia can offer. Since the precedent was established with the special conditions of support for Fiat, it will cost Serbia dearly to attract new companies in the automotive industry sector; however, this can pay off in the long run. The planned 5 thousand employees in Fiat will be paid with around EUR 100 thousand per work position, which will never be earned back if the development of the new automotive industry in Serbia ends with Fiat and its only one model.

As the conditions under which any company in this industry can come to Serbia failed to be defined earlier, it is necessary to define them now. The subsidies should be based primarily on tax relief and on infrastructure provision and they should be tied to the amount of investments, since this is most highly correlated with the technological level of the planned investment.

Construction industry. The most direct effects of the economic crisis in Serbia are felt in the construction industry, and they are vertically transferred to over 30 related industry branches. A constant fall in private investments, a fall in budgetary allocations for capital investments and the lack of opportunity to enter foreign markets without the financial support from the state are major causes of the problems. Hence resolving these problems will help exit the crisis. Currently, works are only conducted at the most important infrastructure projects financed from the budget or from the loans the state was granted. Out of the total of 15 tenders announced in 2010 and 2011 for works on the Corridor 10 and the “South Adriatic” highway, national companies won in only four cases. National companies could not even apply either autonomously or as consortium leaders at other tenders as the tender conditions are such that they cannot meet them. The construction industry too has recorded a substantial fall in production since 2008, especially in exports that amounted to 49.1% for the entire period till 2012. Due to such trends, the employment in the construction industry decreased by 40% and now the industry employs fewer than 80 thousand employees, with a large number of employees waiting for months to be paid their salaries.

To ensure the solvency of the construction companies and enable them to compete on foreign markets, it is

necessary to adopt and consistently enforce the decision on limiting the deadlines for payment of the work completed, start the development bank that will financially support the execution of large state construction projects and issue adequate guarantees for the Serbian construction companies to compete on the national and foreign markets, establish a guarantee fund from the inactive state property to issue bank guarantees to construction companies. It is also necessary to reprogram the loans to construction companies to a longer term and relieve them from collaterals for equipment and machinery that hinder their normal functioning. Twenty years ago, construction industry earned nearly USD 3 billion abroad; today, it earns less than USD 200 million. In order to make the growth on foreign markets come true, it is required that, apart from being efficient, the construction industry implements modern, energy-efficient technologies, as well as the “green” construction elements. Certificates for the implementation of these standards are granted today to 60% of construction companies in the EU; in five years, 90% will be granted these, but none in Serbia. Obviously, this calls for the state support.

Textile, leather and shoemaking industries. The industrial sector that served as the development driver, especially employment driver during the 1990s in many parts of Serbia has been wrongly abandoned. From 230 thousands in 1990, the employment plummeted to 33 thousands last year, which equals the number of employees once working in the region of Užice. The trends in the region, precisely in Macedonia and Bulgaria, are simultaneously reverse. The exports have increased six-fold, while the employment has remained at the same level. Given the current changes induced by the effects of the economic crisis and the events in the countries of Northern Africa with which the EU established a diagonal cumulation of origin of goods as early as 2005 and 2006, many large companies redirected the production of textiles to the Balkan region as well. This sector appears to have a fresh opportunity. The state has done almost nothing to take this opportunity; nevertheless, the companies and small entrepreneurs have made certain adjustments. The exports have doubled in five years and are now worth over USD 800 million, 70% being exported to the EU countries.

The ownership structure, company size, and the labor technology have in the meantime significantly changed, with almost no support from the state, except a total of EUR 36 million in subsidies to investors, which makes less than 1% of capital allocated for support to economy so far. Given that the labor costs in this sector are significantly lower than in other sectors, which significantly contribute to competitiveness, and that this country has enough available capacities to offer to this sector, it is clear that an adequate state support can help improve the employment rate in this sector up to 100 thousand people and achieve three times larger exports over the five following years. In order to achieve these goals, apart from direct subsidies to investors, the state should reduce fiscal and other burdens, establish control of the goods flow on the national market, abolish customs duties on imports of raw materials for the exports-oriented production, support efforts to enhance solvency and export businesses, and provide educational support to improve activities throughout the sector.

The development of industry based on knowledge and innovation

The deterioration of performance of the industrial system in Serbia is not only a consequence of uncontrolled de-industrialization process, but also of a longtime existing crisis of industrial development. It is obvious that sufficiently stimulating environment for industrial development has not been created yet, which has impact on the overall development component that is at a very low level in companies engaged in industrial activities in Serbia [6]. Coordinated strategic management of the modern economy implies constant adjustment of industrial structure (and economy) to increasingly frequent changes in the environment and requires the adoption of a new development concept in which the focus would be on the use of modern technology and innovation ensuring lifelong learning, facilitating the establishment and maintenance of relationships with key stakeholders in the chain of production, etc.

Innovation is a key competitive factor in the global economy. The contribution of institutions of higher education and research to technological recovery and

innovation of industry, as well as initiating of a new spiral of development and transformation of industry should be of a key concern. Namely, Serbia must create models capable of supporting academic-based innovation and its transition to the markets. One model which has proved to be successful in practice is the introduction of technology platforms. Technology Platforms (TPs) are industry-led stakeholder fora charged with defining research priorities in a broad range of technological areas [2]. The essence of the TP is a close interaction of three key participants in the process of technological development [8]: (1) industry, (2) holders of research and development activities, and (3) holders of the investment capital. TPs foster effective public-private partnerships, contributing significantly to the development of knowledge for growth. Public-private partnerships can address technological challenges could be key for sustainable development, for the improved delivery of public services and for the restructuring of industrial sectors [2].

In most European countries TPs have been established in the following research areas: Energy (Biofuels, TPWind, Zero Emission Fossil Fuel Power Plants– ZEP, Renewable Heating & Cooling, etc.), ICT, Bio-based economy (Farm Animal Breeding and Reproduction Technology Platform, Food for Life, Plants for the Future, etc.), Production & processes (Construction Technology Platform, Steel Technology Platform, Technology Platform on Sustainable Mineral Resources, Future Textiles and Clothing, Water Supply and Sanitation Technology Platform, Sustainable Chemistry, Advanced Engineering Materials and Technologies, Industrial Safety ETP) and Transport [2].

In Serbia, a program of the national technology platforms was initiated and developed by the Serbian Academy of Engineering Sciences with the aim of introducing technological dimensions and engineering to the process of recovery and development of Serbian industry. The NTPs program was conceptualized as a structure that is composed of two

hierarchical levels: NTPs Core, which is located in the Serbian Academy of Engineering Sciences and governed by NTPs Committee, and NTPs Individual Platforms, a set of up to 10 individual platforms (production, food, energy, construction, ICT, transport, health, environment, fashion, and materials) that emerges from NTPs Core as a network of mutually complementary, highly networked and interacting entities [8].

Given that the aforementioned program, made on the model of ETPs (European Technology Platforms), is comprehensive and ambitious, it should be insisted on its implementation in stages in view of the limited resources that Serbia has. Through its regulatory mechanisms, the state should support the creation and functioning of national technology platforms in the process of generating and implementing new technological knowledge. This means that it first has to establish NTPs in those branches of the industry that have the most potential to achieve growth immediately (food-processing industry, chemical industry, petrochemical industry, textile, and shoemaking industry), then in the medium term in other promising branches (energetics, automotive industry, building materials industry, waste recycling industry) and, successively, in the long term in some other areas (Figure 2). NTPs will bring together stakeholders in key economic sectors so as to: (1) develop a long-term vision of the sector, (2) create

Figure 2: NTPs organizational structure

Adapted from [8]

a strategy for delivery, and (3) establish a management structure to ensure maximum impact.

Conclusion

The Serbian economy is faced with autochthonous crisis that has lasted for two decades, which has particularly negative impact on the industry. The way out of the crisis requires economic growth that cannot be achieved without consolidation of the economy and focused approach to key industrial branches. In order to succeed, it is necessary to adopt a phased approach. Priority should be given to industrial branches whose facilities are not sufficiently exploited and that have the potential to reach significant growth in a short period of time (food-processing industry, chemical industry, petrochemical industry, textile and shoemaking industry), and then to those branches of the industry that can achieve significant improvements in the medium term (energetics, automotive industry, building materials industry, waste recycling industry). In the modern world, the stability is a value that can be acquired and provided only through persistent hard work, openness to change, and willingness to implement advanced, well-thought-out and balanced reform. A new concept of industrial policy should not only provide support of growth of industrial production, but also facilitate its development and competitiveness enhancement of national industries. The development of the industry requires the establishment of national technology platforms that would enable the improvement of the technological basis and apply experts' knowledge.

Nenad Popović

Born in Tuzla in 1966. He graduated from the Faculty of Mechanical Engineering at the University of Belgrade, and obtained his Master and PhD degrees at the Faculty of Economy in Moscow.

Mr. Popovic is the owner and president of the international company ABS Electro (www.abselectro.com), engaged in the production of electro-technical equipment, creating advanced engineering solutions for a variety of industries such as electrical power, shipbuilding, oil, gas, metal, mining and others.

He teaches at the Faculty of Economy of Moscow's Lomonosov University and the Faculty of Economy of the Moscow State Mining University.

Mr. Popovic is Vice President of the Democratic Party of Serbia and a Member of Parliament of the Republic of Serbia.

He published eight books and over 120 scientific papers in the area of economy and regional development. He speaks English and Russian.

References

1. Ekonomski institut, Makroekonomske analize i trendovi- MAT, br. 206, decembar, 2011.
2. European commission: CORDIS, <http://cordis.europa.eu/technology-platforms/> (accessed 25.01.2012.)
3. Jakopin, E., (2011), "The Framework of New Serbian Industrial Policy", *Ekonomika preduzeća*, vol. 59, iss. 1-2, pp. 73-88.
4. Ministarstvo finansija Republike Srbije, makroekonomski podaci <http://www.mfin.gov.rs/UserFiles/File/tabele/2011%20decembar/Tabela%201%20Osnovni%20makroekonomski%20indikator.pdf> (accessed 24.01.2012.)
5. Ministarstvo finansija, Izveštaj o razvoju Srbije 2010, Beograd, 2011, <http://www.mfin.gov.rs/UserFiles/File/dokumenti/IZVESTAJ%20O%20RAZVOJU%20SRBIJE%202010.pdf> (accessed 24.01.2012.)
6. Petrović, P. (2010/ 2011), "Industrijski sistem Srbije- Amputirano znanje", *Biznis top 2010 – 2011*, www.ntp.rs/wp-content/uploads/2011/11/amputiranoznanje.pdf (accessed 24.01.2012.)
7. Petrović, P., Milačić V., (2010.) "Nacionalne tehnološke platforme Srbije - novi formalni okvir za reinženjering industrije", *Istraživanja i projektovanja za privredu*, Vol. 8, 147- 161.
8. Petrović, P., Milačić, V., (2011), National technology platforms of Serbia, *34th International conference on production engineering*, University of Niš, Faculty of Mechanical Engineering, pp. 15-25.
9. Popović, N., (2011), "Investments into energy supply in Serbia and economic development sustainability", *Ekonomika preduzeća*, vol. 59, iss. 1-2, pp. 99-110.
10. Popović, Z., Marinković, D. (2009): "Revitalizacija i razvoj proizvodnje derivata više faze dorade: preduslov opstanka srpske petrohemijske industrije", *Istraživanja i projektovanja za privredu*, Vol 7/4
11. SARIO, Slovenská agentúra pre rozvoj investícií a obchodu, http://www.sario.sk/userfiles/file/sario/pzi/sektorove/auto/automobilovy_priemysel.pdf (accessed 26.01.2012.)