

2. The Impact of Scientific, Technical and Technological Progress in Globalized World on Industrial Production Development in FBiH

2.1 State of Science, Technological Development and Environment in FBiH

In the overall development of the Federation of BiH, the technical and technological progress is an important factor of this development that ensures realistic increase in personal and social standard and the overall quality of life. Due to this it is necessary to create an efficient technological strategy in order to achieve the desired development of this important factor (technical and technological progress). This strategy should include all economic potentials, but also be supported as important, and treated as a primary political need and requirement.

Creative efforts related to the technological future of FBiH are of crucial importance because for a long time the rate of technical progress in FBiH had a negative trend.*

Considering the fact that a technological strategy has to represent a clearly divided vision of technological goals that wish to be achieved in a certain period, it is necessary to define goals and tasks of technological development by striving to achieve certain quality of living of the society as whole, but also of every individual. The technological strategy in FBiH has to be designed in such a way to offer elements and bases for finding the best solutions for complex issues, which will build the relevant technological structure based on the newest and most efficient scientific discoveries.

When achieving these aspirations, we have to consider the analysis of the previous state of technical and technology sectors, which are characterized by the following facts:

- The origin of equipment in the existing technical and technology sector is mostly (80%) from western industrial countries, and only 10% of the installed equipment was from domestic sources;
- The orientation towards machines, processes and production systems lacked sufficient information technologies which even deepened the lagging behind the developed

* The best examples for this claim are: examples of devastation of technologies in the metal processing industry – „SOKO” – pre-war producer of airplanes and helicopters practically disappeared; ferrous metallurgy (the former RMK Zenica); chemical industry (Sodaso Tuzla etc.)

countries (that already had a modernization process with a focus on these information technologies);

- The war destroyed the existing technological chain in our factories established with the factories outside BiH, which had been established and developed as a single system;
- Staff with university degree, which was the basis of this single system, left the country and found jobs exactly in countries emphasized as generators of technological progress;
- Technological lagging behind was, among other things, a result of increased consumption of material in production.

In addition to all the mentioned things, faster scientific, technical and technological process and development of information and communication technologies in the world lead to the globalization process. Unfortunately, globalization was unavoidable and had two completely different meanings:

- (a positive meaning) global communication, instantaneous news from the whole world, environmental agreements, human rights agreements, internet, e-mail, Interpol and numerous international organizations;
- (a negative meaning) circulation of speculative capital 24 hours a day, risk of financing, exposure to negative trends of global exchange markets, domination of transnational companies in production, trade and investments, money laundering (drugs and crime).

In such an environment, BiH, and therefore also FBiH, had to undergo a transition, whose main characteristic is privatization, which was again unavoidable, and which may be positive or negative for the society as a whole, but also for every individual in the society.

In addition to all this, in the Federation of BiH, globalization manifests itself through several very unfavorable effects such as:

- Globalization as a process that provides subjects in charge of this process with bigger and more efficient use of others;
- Foreign capital mostly comes from the function of profit achievement, and not from the function of development of FBiH;
- Attracting foreign capital resulted in the obligation to decrease or abolish profit taxation, sale of social property;
- Expansion of typical colonial behavior by waiting exclusively for foreign capital.

Due to all this, the economy of FBiH has only one realistic chance to change the low level of economic activities and avoid unfavorable effects of the threatening recession. This chance means standing on its own feet, a modern industrial production and development of small and medium enterprises. The main task of the technological

strategy (and therefore also of the industrial strategy) in FBiH is therefore creation of an incentive framework for creating: a sustainable, internationally competitive and export-oriented sector of the industry and SME sector, which will ensure the economic and social prosperity of FBiH.

This progress has to include:

- An increase in the living standard,
- Better employment,
- Stronger and more balanced regional development,
- Increase in available funds for other social sectors (primarily education, health, pension funds).

2.2 Technology, Competitiveness and Export Potential

Findings of production industry study of BiH are classified as being at the very bottom of the technological sector (only 5% of BiH export is classified as high-technology industrial production).

Weak competitive advantages of BiH are focused on production industrial branches with a low level of technology, and are characterized by the existing resources.*

One of the most promising ways for joining developed countries is orientation towards public and private investments, education and trainings for the labor force, including also development of research centers as potential stimulators and adoption of new technologies.

By looking for a more important role in the increase of the level of competitiveness, the Federation of BiH has to develop comparative advantages, such as geographic proximity and re-establishment of the war-torn production chains and supply networks with the neighboring developed regions, and especially EU.

In FBiH does possess export potential, but it is insufficiently supported and elaborated, and therefore represents an insufficiently used source of growth. This primarily relates to the production of basic metals (aluminum, steel).*

Citizens from FBiH who live and produce abroad are also a significant potential for export growth in FBiH. They are a factor that may play a significant role in the process of directing foreign capital and investments in general in FBiH, especially in the industry sector. It is important that conditions that ensure equal opportunities to all investors are established in FBiH, with clearly defined and unchangeable rules based on which foreign

* These branches are: the metal processing industry, machine industry, wood industry, wood product industry, food industry and textile and clothes industry

* According to the data of the Statistics Agency of BiH for 2006, 27% of the total export consisted of items produced from basic metals; 12,3% of production of machinery and mechanical devices; 11,7% of mineral products; 10,5% of wood and wood products. More than the half of the export consisted of general use consumption goods.

investors may invest even in seemingly risky companies and areas. In order to implement this, it is necessary to create a climate in FBiH in which investors will clearly recognize:

- Favorable environment,
- Ability to permanently ensure raw materials and other inputs of the production process,
- Clear and unique game rules in the single economic space of FBiH,
- Possibility of continuous trainings for the labor force and its availability,
- Good and durable infrastructure both in terms of capacities and prices,
- Readiness and availability of local production capacities that are complementary for specific material inputs,
- Unquestionable safety and promising fiscal incentives.

2.3 Change of Ownership and Revitalization of Industry

In the difficult economic crisis in the world and signs of recession, the possibilities of project financing in FBiH are decreasing too. The only true way of revitalization of the industry as the motor of the overall development in FBiH is establishment of a healthy economic policy and improvement of the level of competitiveness of the sector of private companies as a potential for stimulation of interests of foreign investors for investments in industry development in FBiH. The creators of a healthy economic policy thereby have to consider some difficult macroeconomic facts:

- Slowed real rate of GDP growth,
- Size of the registered deficit on the current account that is getting more and more dramatic every day, especially because of acceptance of unrealistic obligations in relation to social policy,
- High percentage of the non-formal sector in the overall economic activities.

The situation in already privatized companies (especially based on certificates) is alarming, especially due to: serious indebtedness, unpaid liabilities towards suppliers, unpaid contributions for health and pension insurance, unpaid salaries. This negative situation is aggravated additionally by the transformation of PIFs into investment funds, which leads to a decrease of their share in some companies. This "domino" system again leads to the sale of ownership, its additional defragmentation in companies, weakening of corporate governance. These are serious impediments in the process of the necessary strategic changes in the ownership and reconstruction of the companies. This makes the change of ownership and revitalization of the industry in FBiH a particular challenge today and a chance for persons with the necessary profession and knowledge, managers and investors, legislative and executive government.

In labor conditions in a crisis that we are approaching, it is clearly visible to what extent the mass privatization program lacked true transformation of ownership and capitalization, especially since a small number of privatization processes were followed by the inflow of fresh capital and improvement of the existing technology. At the same time our competitors in the neighboring countries, and especially in EU countries, implemented the privatization, which improved the investment level, improved and modernized the technology and production means, which lead to a significant expansion of production capacities of companies that were stronger and able to lead a merciless fight in the market after the privatization. In case of our privatization, the staff structure, especially in case of the management (insufficient knowledge, experience and true business capacity) did not ensure an improvement and progress as a guarantee of survival and development in significantly worse working conditions and market struggle. Instead of the expected and projected positive effects, the privatized companies were frequently sources of significant losses, which lead to dissatisfaction of employees and reduced the available possibilities for overcoming this difficult situation.

2.4 Development of Information Society in the EU (Western Balkans Region)

A more intensive and dynamic development of FBiH, and especially its industry as the basis of this development should be based on several important segments:

- Information and communication technologies,
- Scientific and research activities,
- Establishment of a society of knowledge,
- Modern education at all levels,
- Affirmation of intellectual property,
- Compliance and harmonization with areas that accompany the development of industry,
- Protection and improvement of the quality of living.

Starting with the recognition that information and communication technologies are the most important factors and main catalysts of changes in the modern globalized world, their more courageous introduction and application should open new possibilities and perspectives for all participants in the industry development process. This will render possible unhindered information flow at all levels, effectiveness of transparent data, information, knowledge, more intensive flow of ideas, goods, capital, which again leads to a better availability of all market segments for all industry development process stakeholders. The applicability of the information and communication technologies will have a direct impact on the transformation of modern business transactions, trade and more propulsive organization of existing and new markets.

By intensifying the harmonization and EU accession process, FBiH will create pre-requirements for further growth of a single information space, which will promote an opener and more competitive internal market that is so necessary for the improvement of modern and planned industrial growth. This will promote employment in a way that is in compliance with sustainable development, which improves the quality of living in all areas of Federation, and is particularly important for the development of FBiH and the satisfaction of its citizens.

2.5 Development of Information Society and Education for the Purpose of Industry Progress

We should strive at the development of the Federation, in which knowledge will be the most expensive and demanded product, to be the instigating factor which will unavoidably impose new modern ways of organization, set new tasks and roles to already known systems of entrepreneurial and industrial infrastructure.

With the aim of creating a society of knowledge that consists of education, research and innovation in the current phase of development of Federation, the most efficient factor is bigger focus on research at universities for the purpose of industry development. This primarily relates to better possibilities of establishment of centers for the transfer of technologies, innovation centers, technological parks and other forms of associations with the aim of affirming knowledge, which will render possible faster and fuller use and commercialization of research results. This will at the same time have a positive impact on the development of abilities of universities as research institutions, which will stimulate the process of research excellence and reaching European research relevance. This approach will create conditions and multidisciplinary approach to industry development, where the profession would establish more efficient institutional methods and deadlines for the implementation of achievements.

In this sense it is important that the Federation as a civil society promotes more the importance of improvement of protection of intellectual property, especially in the context of development of a society of knowledge as one of the pre-requisites for a more intensive and wider industry development. For such a development of the industry it is necessary to improve the specific market trend based on the live phrase "sale is market art". Without it, the industrial development loses its impetus power, which eventually slows down the industrial and overall development of FBiH.

In a society of knowledge or information society, the overall progress is achieved by acquisition, accumulation and dissemination of knowledge and information. When developed countries, regional and global organizations define science, education and knowledge, attention is focused on the existing and future knowledge, investments, in material and human resources, research, innovations, true progress and impetus development are advocated.

2.6 Europeization of the Federation of BiH

In section 1.3. we defined the way for long-term and stable preparation and implementation of the europeization of the Federation of BiH. Starting with the recognition that education and the educational system (especially university education) are the key to the current and future development of the society – Federation of BiH, more intensive implementation of the Bologna declaration principles (previous level of applicability) offers an extraordinary chance for a faster total europeization of the Federation of BiH.

The current level of transformation of universities in FBiH (according to obligations from the Framework Law on University Education in BiH and strategy for the application of principles of Bologna declaration), understood also as educational, scientific and research institutions, opens a whole series of questions whose faster and more dynamic implementation significantly impacts the process of europeization of FBiH.

These important issues are:

- Openness and attractiveness of universities for researchers and students through raising of education quality and keeping the democracy of access,
- Design of a model of sustainable financing and efficient use of funds,
- Creation of a balance between the academic and managerial autonomy of universities on the one hand, and responsibility for their own, but also the social development on the other hand,
- Ensuring conditions under which the university as an educational and research institution can reach and develop educational and research excellence,
- Ability of universities as research institutions to reach research relevance – to connect with the economy or immediately use the results of their research.

By accepting the initiative on stronger concentration of research, especially those supporting a faster development of economy, and therefore also of industry, particular attention should be devoted to:

- Creation, harmonization of legal infrastructure for information society with joint efforts,
- Development of a dynamic information infrastructure,
- Creation of an environment that supports the development of economy based on the use of ICT technologies and knowledge,
- Creation of a society of educated, flexible and creative people that have the possibility to permanently educate themselves and find employment,
- Creation of supportive and innovative environment,
- Promotion of development of the society of knowledge,
- Active participation in regional and international cooperation.

2.7 Globalization in the Context of Developing Countries

The international environment is becoming increasingly competitive, demanding and dynamic. The world is becoming more integrated through the expansion of trade exchange, investments and communications. The information and communication technologies lead to faster internationalization of all kinds of services that can be implemented "digitally". The competitive pressure was therefore internationalized. The live cycle of a product became shorter, the production and logistical chains became more globally integrated [5].

The key global trends that change the context of global competitiveness are improved fastness in the creation and dissemination of knowledge, trade liberalization, globalization and physical disintegration of production, outsourcing, increased importance of integrated chains of values, increased role of multinational companies in production and distribution, changed competitiveness requirements [4].

In order to respond to globalization challenges and to make the world function better as a whole, developed countries should improve their ability to adapt to dynamic comparative advantages as a result of fast technical changes, whereas developing countries should focus on an increase in the level of education, infrastructure and technological capacities. For this reason the development strategies of today have to be based on productivity and development of information technologies and economies based on knowledge [5].

Globalization and technology

Technologies are becoming an increasingly important element of globalization and competitiveness. The fastness of technological changes and technological excellence as a necessary requirement for a country to effectively participate in globalization increases the problem of competitiveness of developing countries. Developing countries have to develop more technological abilities and more flexibility in order to succeed in an increasingly demanding global environment [5].

The increasing importance of new technologies may be assessed based on the increasing importance of industrial goods and services in trade exchange. The share of industrial goods in trade exchange in the world has increased to 58% in 1965, to 65% in 1980, to 73% in 1990, or to 77% in 2004. The OECD countries had an increased share of medium and high technological industrial products in the export from 59.8% in 1994 to 64% in 2003 [14,15]. Developing countries that are not capable of producing competitive industrial goods cannot profit in this most dynamic segment of trade exchange.

For technologically undeveloped countries, the acquisition of existing knowledge may lead to an increase in productivity more than the effort to push the technological limits of lagging behind through research and development. The transfer of technology may be achieved through foreign direct investments, purchase of a license, technical

assistance, import of technologies in capital goods, components or products, copying or education abroad. New technologies require new skills for management of technical changes, and therefore also the institutional ability to improve the existing skills [11]. For the use of new knowledge, it is necessary to have better education, numerous technical skills, and a series of institutions, agencies (for standardization, measurement, quality, certificates, etc.) and networks that will render possible an effective use of existing knowledge, and all these elements have to be established prior to serious efforts to create new knowledge and they are key for developing countries.

When it comes to proper creation of new knowledge, this problem is much more demanding, because technology-driven development cannot be reached only based on the production of new knowledge. In the production of new knowledge, it is important to build a system of adoption, adaptation and dissemination of new knowledge. Industrial technologies have to be adapted to local conditions, such as access to raw materials, energy sources, experience of labor force, numerous standards, etc. The knowledge and skills for the acquisition of new technologies at the local level are not very different from the knowledge and skills necessary for creating new technologies. Similarly, as in case of creation of new knowledge, the acquisition of technology requires research and experiments.

Multinational companies are the main producers of the applied knowledge and its dissemination. They frequently introduce new products, processes, businesses or management methods in foreign countries and thereby ensure a good example for other domestic companies that imitate their system of values. They also train workers and researchers that may disseminate certain kinds of knowledge and experience to other companies.

An efficient dissemination of knowledge requires adequate mechanisms for education of potential users of certain technologies, and this process frequently includes additional education, and not just securing of technical information [1]. Dissemination is also implemented through sale of new machines or other inputs followed by the new technology.

Globalization and education

A consequence of the trend of faster production of new knowledge and dissemination of knowledge is such that developing countries should find an effective way of participating in the fast growing market of global knowledge. Those countries that are more advanced also have to invest into the proper research and development in order to be able to compete with the new limits of technological progress.

The technological progress is complementary with specialist skills and university education [7], which means that education and expert skills are becoming more important for international competitiveness. Multinational companies, among other things, when choosing locations for investments, make decisions also based on education and skills of the local labor force.

This means that countries have to invest more in the improvement of education and skills. The global average education in the world is improving. Due to the present knowledge revolution, there is a need for persons to learn a varied set of new skills, and in this context emerged the term "knowledge worker" [8]. Many workers in developed countries go back to studying in order to acquire new or more titles (knowledge) or to acquire certificates in specialized expert skills. There is a need to think about the term long-life learning.

Developing countries have to take care about a better access and quality of secondary and university education. A better access to university education also exposes developing countries to the brain drain, so that governments have to consider this problem when creating the educational strategy. Especially the governments of developing countries have to analyze education and acquisition of skills in the context of the integral system of life-long learning and design a system that will have more providers and more ways of reaching different levels of qualifications and certificates [6].

Globalization and innovation

Competitiveness used to be based on statistical comparative advantages. Today, however, the competitiveness does not depend only on production costs, or a certain technological advantage. It depends to a large extent also on **continuous innovation**, expert skills and learning, efficient communication and transport infrastructure [6].

In the context of fast development and spreading of new knowledge, innovation becomes an unavoidable element of competitiveness and companies therefore have to continuously innovate in order to avoid being left behind. This does not mean that they have to move technological limits, because only leading companies can do this. However, all companies need to at least be fast imitators and adopters of methods for use and improvement of new technologies in order to avoid being left behind in terms of competitiveness. This creates a continuous pressure on companies in terms of investments in technological capacities.

Innovation means much more than creation and initiation of new products. It also means how to deliver services, how business processes are integrated, how companies and institutions are managed, how knowledge is transferred, how public policy is defined and how companies and communities participate in it and what is its use [16]. The growth of competitive ability occurs at all levels: workshops, process and production engineering, quality management, stock management, logistic chains and connections to other companies and institutions. Research and development is not related only to the process of innovations, but in case of more complex technologies, research and development are needed for their successful absorption [10].

Globalization and developing countries

The consequences of an increasing globalization for developing countries are the fact that they are more exposed to everything going on in the world. Due to the fact that everything is happening fast, and that they are facing global competition, they have to develop greater abilities than before in order to react adequately and fast in compliance with new threats and opportunities.

Developing countries have to position themselves in the attempt to use the opportunities offered by the more demanding globalized world, whereas on the other hand they have to avoid threats of globalization. In order to use their chances, they need to invest more in human resources, which means that they not only have to invest into secondary and university education, but also in the life-long learning system [5].

There are many examples from the history on positive and negative consequences of globalization for the economies of developing countries. However, in today's conditions it is not simple to repeat positive examples due to the fact that the historic context of globalization has changed.

Some countries started developing thanks to the cheap labor force to eventually become knowledge based economies. After significant foreign investments were attracted due to cheap labor force and after a more significant increase in salaries due to big investments, the governments invested much in education and improvement of expert skills of the labor force in order to keep the country competitive.

Some countries developed industrial sectors that consisted of small and medium-size companies, whereas the government developed a strong technological and infrastructure support such as technical information services and specialized public research institutes. Some countries lost competitiveness due to high transport, electricity and other infrastructure costs and a relatively low level of education of labor force. Some countries had a strategy of acquisition of new technologies through foreign direct investments, whereas others invested into proper research capacities. China, for example, was very effective in its own creation of knowledge, but also its approach to global knowledge through trade exchange and foreign investments [5].

Many countries intensively used foreign investments as a means to acquire foreign knowledge through trade exchange, "reverse engineering", copying and large investments in proper research and development. They also invested in the secondary and university education. A high level of education facilitated assimilation of foreign technologies and development of proper technological capacities, including also big investments in research and development.

However, there are global examples of big economies that have the critical mass of well-educated staff and significant investments in proper research and development that have not considerably contributed to the economic growth. The reason is the fact that such countries have not developed an efficient economic and institutional system for

adequate use of new knowledge for economic growth and competitiveness. Russia may be an example of a state that produces many new fundamental pieces of knowledge, but few commercial applications [5].

Bibliography

- [1] Abramovitz M., *Catching Up, Forging Ahead, and Falling Behind*, Journal of Economic History, 46(2), 385-406., 1986.
- [2] Baldwin R., *Globalization: The Great Unbundling(s)*, paper contributed to event on Globalization Challenges to Europe and Finland organized by the Secretariat of the Economic Council, Economic Council of Finland - Prime Minister's Office, 2006.
- [3] Berger S., *How We Compete: What Companies around the World are Doing to Make it in Today's Global Economy*, Random House, New York, 2006.
- [4] Ciscel D. H., Smith B. E., *The Impact of Supply Chain Management on Labor Standards: The Transition to Incessant Work*, Journal of Economic Issues, 39 (2), 429-437, 2005.
- [5] Dahlman C.J., *Technology, globalization, and international competitiveness: Challenges for developing countries*, Industrial Development for the 21st Century, Georgetown University, Edmund A. Walsh School of Foreign Service.
- [6] Dahlman C.J., Zhihua Z., Wang S., *Developing a System of Life Long Learning in China to Enhance Competitiveness*, World Bank, Washington, D.C., 2006.
- [7] De Ferranti D. et al., *Closing the Gap in Education and Skills*, World Bank, Washington DC, 2002.
- [8] Drucker P., *The Age of Social Transformation*, Atlantic Monthly, Vol.274, 1994.
- [9] Evenson R.E., *Economic Growth, International Technological Spillovers and Public Policy: Theory and Empirical Evidence from Asia*, Economic Growth Center, Yale University, 1997.
- [10] Lall S., *Reinventing Industrial Strategy: The Role of Government Policy in Building Industrial Competitiveness*, UN Conference on Trade and Development, 2004.
- [11] Lakhwinder S., *Globalization, national innovation systems and response of public policy*, Munich Personal REPEc Archive, 2006.
- [12] Lakhwinder S., Baldev S., *National Innovation System in the Era of Liberalization: Implications for Science and Technology Policy for Developing Economies* Munich Personal REPEc Archive, 2009.
- [13] Noland M., Pack H., *Industrial Policy in an Era of Globalization: Lessons from Asia*,

Institute of International Economics, Washington DC., 2003.

- [14] OECD, Internationalization of Higher Education: Opportunities and Challenges, Paris, 2004.
- [15] OECD, Science, Technology and Industry Scoreboard 2005, Paris, 2005.
- [16] Palmisano S., The Globally Integrated Enterprise, Foreign Affairs (May- June), 2006.

