High Technology as a Source of Competitive Advantages

UDC: 005.591.6 ; 334.71:004 ; 658.11:004

Mr Aleksandra Tošović-Stevanović
Faculty of Business studies, Belgrade

All economies generate or exploit new technology and knowledge, but some are more intense in this process than others. High technologies are very important for this study, as they provide firms with competitive advantage by changing the key success components. High technology economies are the primary source for generating money in contrast to the economies dependent upon resources, labor and capital, which have been dominant during the last century. The significance of certain countries that have made a great technological impact, which was made possible due to their continual investments in science and technology and R&D were also shown in the study. The OECD acknowledges four groups technologies as competitive advantages in the field of advanced technology (low, medium-low, medium-high and high technology), in respect to their R&D intensity.

1. Introduction

Technology is the basic source of competitive advantage in the twenty-first century. This is best seen in high technology firms. Science provides new solutions, resulting into the automation of the production and labour processes, organizational flexibility, creation of modern systems, specialization and a new approach to the product and service quality.

In order that all these be achieved, the crucial problem for the firm is that of the access to new technologies. In the developed economies it is relying to their own research and developmet activity; the developing economies, however, will do best to follow the path of those that have already accomplished this goal.

The analysis of competitive dynamics strongly relies upon five technologically interrelated characteristics. Firstly, technological opportunities refer to the potential of innovations among the value chains of the firms within one industry. Secondly, the competitive dynamics differs in the degree of appropriation of benefits resulting from the innovational activity. Thirdly, the liability resources demand that the competitive dynamics changes be successful. The knowledge based economies that require fundamental research, may demand larger resource liabilities than industries based on technologies, including additional research and development. Fourthly, major rivals generally range from institutional management to the market. Finally, varied competitive dynamics requires an equally varied speed of execution [10].

2. Technological changes

The changes in the economy structure are continuous. A new technology which is a result of innovation, results in turn into the emergence of new firms and new industries. Tracking the product or the firm's life cycle allows for tracking the structural changes in the national and international economies.

The impact of technological change upon the changes in economy is significant. Its effect is especially evident in the growth and development of firms and of each individual industry. Technological changes also contribute to the strategic change in economy. They challenge the firm's present competitive advantage, but also create a new one, stronger than the present advantage.

Technology is a process, technique or methodology – materialized in the product design or in manufacture or service providing processes – that transforms the inputs of labour, capital, information, material and energies into the outputs of a greater value [3].

Technology refers to the processes in which the organization transforms the labour, capital, materials and infromation into products and services [3].

Technological changes have an important role in the competitive dynamics. The outcomes of the changes are several. Firstly, it is new products and processes. Secondly, it is the change in the value chain and in the firm's constellation value. The changes also change the nature of rivalry among firms.

Technological changes result in the conditions in which many products and services cease to be competitive, therefore the firms undergoing such a process can resort to only two options: cut on expenses or implement technological change that will help create new products or services. In a dynamic economy this is a permanent process and serves as an unbiased estimate of the scope of the technological change [10].

In case of major technological changes it is not easy to recognize which benefits can be anticipated, not only for the prospective buyers of new products or services, but also for the innovating firm itself. Nevertheless, the firm has to implement technological change, otherwise it

may be caught in delay, and the consequences may be the lost time, delays in new investments and instability in its competitive position on the market.

The effects of technological change are not the same in every one industry. In certain industries the change is viewed as an opportunity to improve the strategic position on the market, however, it may prove to be a threat for some of them. In any case, regardless of the above stated, technological change is one of the promoters of competition. It is by the technological change exploitation that the leading firms on the market have acquired such a position.

Technological changes not only reduce the costs of business operations, which was the original goal, but also make the firm capable of changing its market orientation. In some cases, new technologies even lead to opening new markets [10].

The task of the firm management is to analyse the critical factors and then to rely upon those they intend to use to improve the firm's competitive position. The world economy knows the firms that build their competitive position on their wealth in raw materials and cheap labour. There are, however, firms that build such a position even though they are not rich in raw materials and their labour force is expensive.

Technological innovations are regarded as the earliest implementation of science and technology in a new direction and with commercial success [3]. The statistical definition of the technological innovation, as stated by the Eurostat [10], includes the development of the products and processes and a restricted amount of organizational innovative activities such as marketing and training of those directly involved in the implementation of new products, services and processes.

In order that it be commercially successful, the innovation has to be perceived as a new value for the customer. Here technological innovation alone is not sufficient; it is often followed by a new business model. What is important is that a new market is created, either through a technological innovation, or by a business model, or through the combination of the two.

Innovators or innovating firms are firms that have introduced new or improved products or services, or new or improved processes onto the market. The firms may be innovatively active without introducing innovation onto the market (innovation may be commercially uneconomical or the innovation project has not been completed yet). We must bear in mind that innovation *is new to the firm introducing it* regardless of whether it is new to the competition – at home or abroad (Radman et al., 2003). What is crucial here is whether the firm achieves economic effect, that is, whether it commercializes the innovation.

One of the key promoters of economic growth is the diffusion or spread of innovation throughout an economy. The spread of innovation is not a simple process achieved only by market automation. It is a complex process which includes, in addition to the market as a key mechanism, numerous non-market elements, such as a developed support system to R&D and the cooperation both among the firms and between the firms and the infrastructure organization.

Productivity may not improve automatically with the country investing into the R&D and innovation. Technology and technological changes are not automatically translated into productivity and consequently into competitiveness. For example, the diffusion of information technologies (IT) does not automatically improve productivity, if its implementation is not directed towards the key agents in the business process, that is, towards those aspects of the business process that create value for the customer. Productivity can also be a result of downsizing and need not necessarily be related to the new technologies implementation [10].

3. Characteristics of high technologies

High technologies are implemented by the firms whose products or services include advanced and innovative technologies. Common to these firms is that tehy rely on advanced scientific and technological studies and generally spend much on research and development. One criterion of a country acquiring competitive advantage is that it has achieved a high level of large scale and sustainable exports in the high technology sector.

As a support to new techno-economic paradigm (TEP), *high technologies* are the ultimate product of an increased and specifically structured investment into scientific research, an intensive interactive relation between science and economy, but also of an overall development of scientific and research complex and innovative activity.

The ways in which high technologies can be more precisely defined and classified are various. The following classification is based on the properties that high technologies have in the effects they generate in an overall and complex impact upon the economic and social system on the global level [3].

The high technology properties are [3]:

- high and increasing capital, educational, scientific and information intensity;
- low and declining energy and resource intensity;
- low and declining, and in certain cases (clean technologies) no harmful effects upon natural and social environment;
- high capital-earning capacity;
- low vulnerability to crises and marginal effects of crises in the environment;
- the shortness of life cycle of the products, goods and services as well as of technological systems and processes;
- high income elasticity of demand;
- high and increasing flexibility of reproductive systems and processes;
- high educational needs, especially for highly qualified workforce and creative work;
- a major importance of state intervention in all the phases of creating, development and implementation of high technologies and their products;
- low import demands and creating a low or temporary import dependence, primarily within international or global systems.

Common to the firms whose products or services are characterised by innovative technologies is that they rely on advanced scientific and research studies and are generally known for their high expenses in research and development (Keeble, Wilkinson, 2000). The high technology sectors are those of aircraft industry, computers, software and similar services, electronics, semi-conductors, pharmaceutical industry, scientific instruments and electrical machinery (OECD, 1990). The notions *technology products* and *products of advanced technology* are also used to denote high technology products.

The high technology sector contributes to a rapid growth and development of production and services by increasing the general efficiency of work and capital. The research conducted in the last decade of the twentieth century has shown that the growth rate in the fifty most advanced countries (as regards R&D intensity, the number of scientists and engineers) was three times as high compared to the rest of the world in the 1986-1994 period (OECD, 1999). High technologies provide competitive advantage to firms by changing the key success factors. In some cases, small firms with limited experience have managed to get over the shortages imposed by dominant competitors through technology innovations. In the majority of the OECD countries, the commerce in the industrial sector is characterised by an increased presence of high technology products.

General trends are clear, however, substantial differences among countries still remain. The USA, Great Britain, the Netherlands, Japan, Finland, and Ireland are the leading countries in the knowledge based economy, measured by their share in the high technology exports. Similarly, the exports of high technologies in the developing countries are concentrated in a small number of countries, mostly in South Corea, Malaysia, the Philippines, Singapore and Thailand (WB, 2001). A large number of other developed or developing countries lag in many important fields including investments into innovations and the increase in the highly qualified workforce (OECD, 2001; Mani, 2000).

The exports of high technologies of the developed and the developing countries are generally similar in terms of product specialisation and technology sophistication. The available data on the high technology exports (1997) show that both groups of countries increasingly specialize in the manufacturing and exports of components and parts in electrical products and office equipment.

The developed countries tend to achieve a greater variety in the exports structure, whereas a large number of developing countries have yet to develop technology competences (WB, 2001). Even among the top five countries – high technology exporters – it is only South Corea and Taiwan that can boast of significant national technology competences. This means that multinational companies get the maximum from the exports of high technologies from these countries.

The country's market competitiveness of technology advantages is achieved when in new products and processes it can give an important estimate of economic productivity of its scientific and technology systems. For example, many Asian countries have become significant suppliers of high technology products on the world market. Such an achievement is an indicator of the orientation towards the development of high technologies through building up the necessary scientific and technology resources (WB, 2001).

The customer sophistication has an important role in the increase of a country's exports of high technology products. The results show that there is a positive ratio between the customer sophistication and the high technology products exports, since in this way the companies are forced to introduce advanced technologies in order that they remain competitive (Seyoum, Belay, 2005).

4. The oecd classification into four groups of technologies on the basis of the r&d intensity level

The firms with a higher level of technology intensity have more opportunities for innovations, for capturing new markets, for a more productive implementation of available resources and paying larger rewards to the people working for them. The high technology industries expand in international trade and it is their dynamics that helps them improve efficiency in other sectors [2]. To analyse the impact of technology upon the economic efficiency, it is important that branches of economy and industries that are more technology-intensive be identified, by the criteria allowing for creating specific adjusted classifications. The classification is designed for the needs of the OECD and in collaboration with the Eurostat and is made for the purpose of offering a more appropriate tool for the international trade analysis. Since no data was available for the services, the two proposed classifications dealt with only manufacturing industries [2].

The method the OECD applied in the classification of sectors and products according to the technology level was based on the classification made in the USA and later applied in all the OECD countries. It was the first time that the countries were ranked and compared in the high technology field.

In the second phase, in 1984, the OECD developed a new classification, using the sample of eleven countries. The classification was based on the direct R&D intensity (the quotient of the R&D costs and the flow of the materialized technology by the output unity in 22 sectors of manufacturing industry) thereby a list was created classifying the economies into three categories, adopted by both the OECD countries and many others and used widely [2]:

1. high technologies
2. medium technologies
3. low technologies.

The advantage of the classification was in that it provided a simple and suitable forms for international comparisons; however, there were limitations too, mainly due to the lack of sufficiently qualified data on sectors. Ten years after the first list was drafted a need arouse for taking certain improvements into consideration [2]. Consequently, the OECD prepared two new lists: one for the sectorial approach, and the other for the production approach. The data used in creating the sector list is based on the *International Standard Industrial Classification – ISIC*. The new classification covered only the prerađivačka industry for which the OECD prepared long and relatively complete series. In the sector approach, however, it was necessary that services be included, with an appropriate accessibility of data, since services increasingly moved from usage towards manufacturing. The production approach was developed as an annex to sector one and provided a more appropriate system for the international trade analysis. It was based upon the *Standard International Trade Classification – SITC*.

Under the assumption that for a certain type of investments and for all groups of products the scope of R&D costs incurred in the production remained constant, the input-output coefficients were multiplied by a direct R&D intensity.

These indicators were calculated for the 1973-1992 period, however the final classification was designed for the 1980's and 1990's data, using all three indicators: the economies classed into a higher category display a higher R&D intensity for all the indicators compared to the lower category economies (one exemption being petroleum).

Four groups of manufacturing industries are recognized as a result [2]:

1.high technologies
2. medium-high technologies
3. medium-low technologies
4. low technologies

The evolution going on within that frame is possible to witness on the example of the most highly developed OECD countries in the modern world economy.

5. International trade vs technology intensity

The economic activities of high technologies are more oriented towards international trade compared to less technology-intensive economic activities. Although they make up only 25% of the total OECD trade in the product manufacture, their share increases faster than average in the production.

In the 1996-2005 period, the pharmaceutical industry recorded the highest growth rate in the industrial trade in the OECD. Other high technology industries, scientific instruments, aircraft manufacture, radio, TV and communication also recorded a high growth rate (Graph 1). Among the high technology industries, a relatively slow growth was recorded only in office equipment and in computers [7].

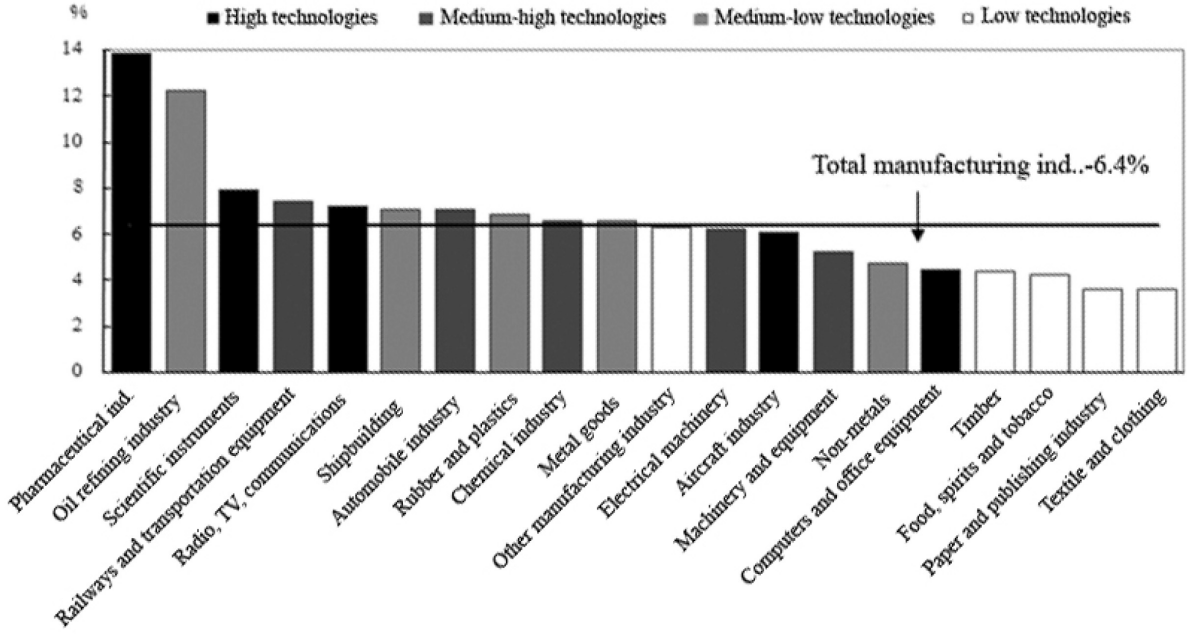
High and medium-high R&D-intensive industries made up more than two thirds of the total industrial exports of the OECD countries in 2005. Differences among the countries are substantial. The share of the high and medium-high technology economic activites ranges be-

tween more than 80% in Japan and Ireland to less than 10% in Russia.

High technology economic activity amounts to over 50% industrial exports in Ireland and over 30% exports in Switzerland, Corea, the USA, Great Britain and the Netherlands [7]. In Japan and in Gremany, the exports of economic activities of medium-high technologies include machinery and equipment, motor vehicles, chemicals, etc.

Technology-intensive exports and high technology exports are responsible for a majority of growth in trade in the last decade of the twentieth century. Japan is the only country in which the total industrial exports increased at a higher rate compared to the exports of high technologies in the 1994-2003 period. Technology exports record higher growth in Iceland, Turkey and in East European countries, although the orientation of a majority of these countries, Hungary and the Chech Republic exempt, was primarily towards exporting low and medium-low technologies. With nearly 17% of the total technology exports from the OECD, Germany had the largest share of the technology market in 2003, followed by the USA.

The estimate of the countries in terms of technology intensity strengths and weaknesses must not be directed only to exports, but must also define the role of imports, since exports can largerly depend on the imports in the same economy. The indicators of the comparative advantages revealed (*Revealed Comparative Advantage – RCA*) allow for a better understanding of a country's specialization profile.



Graph 1. Growth of industry on the basis of economic and technology intensity, OECD (1996-2005).

This indicator shows that only a small number of the OECD countries specialized in high technology development. In 2003, the trade surplus in these industries amounted to over 6.5% of total production in Switzerland, 5.5% in Ireland and approximately 4.5% in the USA. The trade surplus in medium-high industries amounted to over 15% of the total output in Japan and over 7% in Germany.

The competitive advantage of Japan in the share of high technologies plummeted during the 1990s, at the same time rising in Ireland. The advantages of the Chech Republic, Finland, Hungary, Poland, Turkey and New Zealand declined to a great extent. The medium-high R&D-intensive industries have undergone substabtial changes, resulting in improving the competitive advantages of many countries [6].

6. New high technology exporters

In the last decade of the twentieth century a number of countries have made considerable advances in the field of technology and distinguished themselves in the development of technology as a result of their large and long-term investments into science and technology (S&T), and into education and R&D. Their achievement, however, may depend on other factors too, such as the political stability, access to capital and the infrastructure capable of supporting the technology progress.

In 1987, the Georgia Tech Technology Policy and the Assessment Center (TPAC) created the high technology indicators (*High Tech Indicators – HTI*).

Starting from 1990, the analysis was conducted on a three-year basis. The 2003 analysis was carried out on the sample of 33 countries.

There is a number of leading indicators important for the countries that wish to use their potentials to grow into important exporters of high technologies. The HTI are based on the model identifying four *input indicators*:

- *National orientation (NO)* – the evidence that the country undertakes steps to become technologically competitive, which is shown by the country's explicit or implicit strategies that involve cooperation between the public and the private sectors.
- *Socio-economic infrastructure (SE)* – social and economic institutions supporting and sustaining physical, human, organizational, and economic resources important for a modern, technology based country. The indicators include the presence of dynamic capital markets, the growth in foreign investments and the state investments into education.
- *Technology infrastructure (TI)* – social and economic institutions directly contributing to the country's capacity to develop, manufacture and place new technology. The indicators show the presence of the systems for intellectual property protection, the scope in which the R&D activities are oriented towards implementation in economy, competitiveness in high technology development and the capacity to develop qualified scientists and engineers.
- *Production capacity (PC)* – physical and human resources dedicated to creating industrial products and efficiency in using these resources. The indicators include the current level of high technology development, the labour force quality and productivity, including the presence of professionals and the innovative management practice.

The HTI are based on the model identifying *three output indicators* as well [9]:

- Technological position in industry and capacity of high technology products exporting (TS),
- Technological importance in the export mix (TE),
- Rate of technology changes (RTC).

7. HTI indicators analysis

On the basis of this group of indicators, Israel and China were assessed to be top two countries among 15 countries that were assessed (Argentina, Brasil, China, the Chech Republic, Germany, Hungary, India, Indonesia, Israel, Iceland, Japan, Malaysia, Mexico, the Philippines, Poland, Thailand, the USA, and Venezuela) in 2005. Both countries were presented as future leaders in the exports of technology products on the world markets. Israel achieved the top position in the orientation based on strong government and cultural support in the promotion of manufacturing technology and occupies the top position in the socio-economic infrastructure field due to a large number of qualified scientists and engineers, highly reputed economic entrepreneurship and its contribution to scientific knowledge. Israel occupied the second and the third positions in the two remaining indicators.

The total rating of China in 2005 is lower compared to Israel, however with a notable rise in the total ratings in the last two years. China improved in the fields of all four indicators and made substantial improvements in three: national orientation, technological infrastructure and manufacturing capacities. The number of population has helped raise the ratings of a certain number of indicator components. This shows the impact of the effects of scope upon the advantages of developing countries, in terms of large domestic demand for high-technology products and the capacity to train a large number of scientists and engineers.

The rankings of Iceland and Israel were lower compared to China, in the same period. The Chech Republic and Malaysia achieved high total ratings, due to high ratings for national orientation and production capacity. Although their total ratings are still not high, some countries are already setting the basis for the production and exports of high-technology products in the near future. Thailand, Mexico and Argentina showed advances in each assessment in the 2003-2005 period. The rating of Thailand in 2005 was higher due to the increase in electronics production. The general rating of Mexico was higher in 2003, on the basis of higher expert assessment of the national orientation and technological infrastructure, as well as a higher statistical ratings of students' enrollment into high schools and universities. The 2005 ratings for Mexico were steady in all the three indicators, with the rank in production capacity rising. Argentina recorded a gradual but steady rise in the majority of indicators in 2003 and 2005.

These indicators offer a systematic method for comparing the future technological capacity for a larger group of countries than it would be possible using other indicators. The results show that the groups of countries competing on the high technology markets can extend in the future. The result also reflect significant differences among a number of new and transitional economies [9].

Figure 1 shows the production capacities of high technologies in 2005 and the projection in the following 15 years. Five groups of countries are presented on the scale from 10 to 50, where 10 presents the countries in which there is basically no production, whereas 50 presents the countries with considerable industrial activity with the products of technology advantages on the international market. Great Britain, Switzerland, Sweden, the uSA, Germany, and Australia show productive capacities exceeding the anticipated future production capacities. The anticipated rise in the production capacity of Asia and South America is highest. These measures contribute to getting a broader insight of the global technological competitiveness.

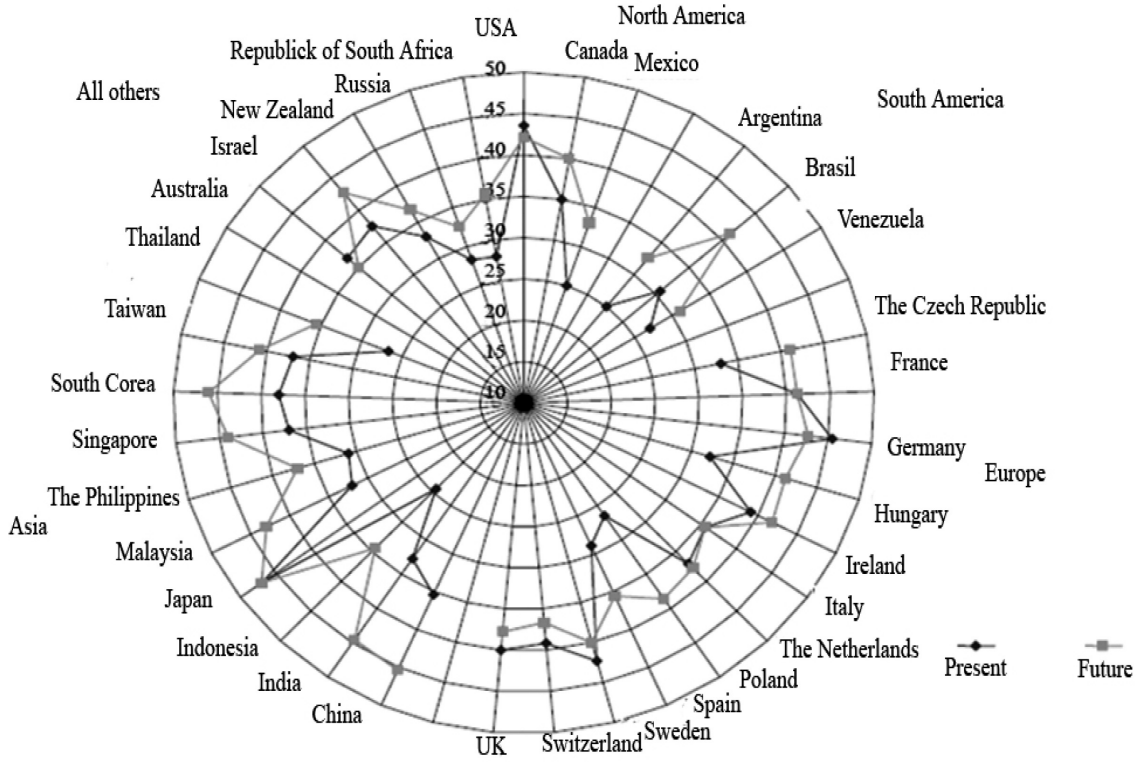


Figure 1. Present vs Future (15 years): high technology production capacity in 2005.

8. Forms of cooperation in the field of high technologies

Faced with new forms of competition, many companies invest their assets and expert knowledge to develop new products, reach the economy of scope and the access to new technologies and markets. One of the major factors that prevent many firms from developing their technology, and consequently their strategic goals is the lack of means. The field of research and development demands substantial financial means and a critical number of human resources. The costs of acquiring and improving the necessary professional and technical skills as well as of specialized equipment acquisition increase continuously. Even in case of largest corporations, the leadership in certain market segments they have traditionally dominated is not sustainable any longer, as they do not dispose of enough technological capacities to adapt to fast changes in market demand.

Strategic alliances are a combination of joint ventures and licencing agreements, joint research and development activities, agreements on long-term supplying closed between companies from different countries. They may be made within one industry (intraindustrial) or among different industries (interindustrial). They are formed for a limited period in which the ownership in the organization does not change. It is a relationship between the firms in achieving strategic goals, which creates value for the customer and profitability for the partners. Strategic alliances are a specific form of joint firms, that is, informal or formal arrangements between two or more companies with a mutual goal [11]. They are the result of the growth in global competition, the growth in needs for investments into new technologies, and the rise in risks. In terms of their complexity, alliances may be ranked between the customer-seller business arrangements and full acquisitions. A significant advantage of alliances is their flexibility, i.e., their capacity to adjust to environmental changes.

Strategic alliances function as a complex and interrelated innovation system, reaching by far further into business than the traditional implementation of technology through imitation. Their strategy is to develop the innovation process on the basis of modern technology. "In recent years, competence and knowledge have increasingly been the focus of successful firms as a tool to improve competitive advantage. The learning process and the manner in which it is conducted are closely linked to the connections and relations, that is, to networks. A more intensive joining the networks and their interrelation enhances the learning process and is directly reflected upon the firm's business performance. Firms acquire knowledge and learn in various ways. The network assisted learning process itself is primarily affected by the characteristics of the learners themselves (their competences, ambition sharing) and types of realtions" [11].

Strategic alliances are designed for the purpose of improving or dramatically changing the position due to the development of new technologies, new products and new markets. The alliences' goals are generally manyfold. For example, the goal of an alliance may be the access to technology, acquiring a larger critical mass and risk sharing in the future technology development. The elementary reasons for forming strategic alliances are as follows [11]:

- better access to capital;
- larger technical critical mass;
- risk and responsibility sharing;
- better relationships with strategic partners;
- benefits from technology transfer;
- reduced costs for research and development;
- implementation of distributive skills;
- access to marketing strengths;
- access to technology;
- standardization;
- usage of side products;
- training in management.

There are three basic types of strategic alliances [4]:

- corpotare cooperation;
- joint technological development;
- outsourcing.

Corporate cooperation includes the relationship between large and small companies. Large companies provide the capital and all the relevant market information that contribute to creating innovative products and services, whereas for small companies this cooperation means an access to the real world of technological development and allows for the technology flow from external sources.

Joint technological development involves two or three firms that join togetherfor a defined periof of time for the purpose of conducting a research project, the benefit of which is important for each of them. These can be R&D projects, team work, exchange of technology knowledge or joint ventures. Some firms contribute their technological or market knowledge, others contribute their managerial and operational knowledge and skills.

Outsourcing creates direct and indirect opportunities for the access to the business partner's knowledge and skills, technologies, competencies, strategic orientation [4].

Strategic alliances can achieve a sustainable competitive advantage on condition the cooperation involves the learning transfer. They provide the framework that helps such partnerships develop a cooperative environment in which learning is made possible for the purpose of achieving a long-term success. Highlighting the importance of learning halps develop individual and organizational understanding, thus providing the future success of strategic alliances.

9. Conclusion

The experiences in the development in the last decade of the twentieth century show that the more physical-capital and cheap-workforce based products and services the country had in its exports, the poorer it became. On the other hand, the countries that raised their living standard actually achieved that prosperity by exporting the higher-level developed products and services, placing them to highly demanding customers, and simultaneously acquiring higher prices for their products.

The technological aspect in the global world is by far a greater challenge to small and developing countries compared to the devoped ones. The accessibility of modern technology solutions and their availability under favourable conditions may contribute to narrowing the gap as regards a substantial technology lag of certain countries behind the developed world. Here we should add further investments into science, into education and into research and development. The knowledge-based economy, guaranteeing a sustainable economic development, must be a priority goal in achieving competitive advantages.

Globalization, as well as increasingly present innovations in the field of technology have significantly changed the rules of business operations on the world

markets and introduced novelty in the business orientation of the firm. The struggle to capture the market share is becoming more aggressive and more dynamic, making survival possible only for the firms that built a high level of flexibility and innovativeness into their business environment.

The paper points out that, in view of dynamic interaction, the production factors determining the competitive advantages in certain fields of business (technology achievement level, ownership of capital, appropriate qualification structure of staff, infrastructure, information technologies) are the crucial characteristics of the states' competitive advantages.

The development of high technologies of broad range and their implementation in the process of reproduction is one of the key answers to the economic and social mechanisms of the world economy. Modern times make it clear that advanced factors based on knowledge and on developed infrastructure, on high technologies and innovations, are the bases of economic development.

REFERENCE

[1] Afuah, A. *Innovation Management. Strategies, Implementation, and Profits,* Oxford University Press, 1998

[2] Hatzichronoglou, T. "Revision of the High-Technology Sector and Product Classification",*OECD Science, Technology and Industry Working Papers*, 1997/2

[3] Kotlica, S. *Osnovi tehnološkog menadžmenta*, Megatrend univerzitet primenjenih nauka, Beograd, 2005

[4] Narayanan, V. K. *Managing Technology and Innovation for Competitive Advantage,* Prentice Hall, 2001

[5] OECD *Globalisation of Industry. Overview and Sector Reports*, OECD, Paris, 1996

[6] OECD *The changing nature of manufacturing. Science, Technology and Industry Scoreboard*, OECD, Paris, 2005

[7] OECD *Staying Competitive in the Global Economy – Moving Up the Value Chain*, OECD, Paris, 2007

[8] Pilat, D., A. Cimper, K. Olsen and C. Webb "The Changing Nature of Manufacturing in OECD Economies", *STI Working Paper*, OECD, Paris, 2005

[9] Porter, A. L. (eds) *High tech indicators: technology-based competitiveness of 33 nations 2005 final report,* Technology policy and assessment center Georgia Institute of technology, 2006

[10] Radman, G. i dr, *Razvoj inovativnosi i tehnologije,* Nacionalno vijeće za Konkurentnost, Zagreb, 2003

[11] Cvetković, S., Ribać, S. *Strategijske alijanse i inovaciona sposobnost preduzeća,* Ekonomske teme, 2004