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Sources of Innovation

Abstract: The intention of this paper is to analyze the possible sources of innovation in Serbia. It is quite clear that the Serbian economy will face the numerous challenges in the years to come. One of the most important of all is the need for a continuous improvement of its international competitiveness, as an unavoidable prerequisite for sustainable and long-term economic growth. The most important and effective driving force in achieving a successful economical growth, among many others, is the capability to generate the new knowledge in the form of inventions, resulting in new and improved products. The ongoing worldwide economic crisis in general, and in Serbia in particular, underlines and imposes the need to highlight the importance of creation and introduction of new products through innovation. Accordingly, there is a need to review and to systematize the possible sources of innovation and its more effective use in creation and commercialization of new products.

Keywords: Innovation, source of innovation, quality management

1. INTRODUCTION

Innovation is a very complex phenomenon. It is an overall capability of a society, its governmental and educational institutions, companies and individuals to generate the positive climate, better educated people, highly motivated to use the new knowledge and new ideas for the creation of new products.

It requires an affective and efficient network which includes an active role of the government and governmental agencies through suitable financial supports, contribution of educational institutions at all levels, involvement of research institutes, and particularly private companies to recognize the needs and potentials for the growth recruiting and motivating the talented people to create the new products, with a potential to compete at the international market.

The particular aim of this paper is to consider the role of individuals capable of motivated to be innovators. The readiness, capabilities and motivation of business companies to be effective users of innovations will be reviewed.

Finally, the possible contributions of higher education institutions, universities and government agencies will be considered, too.

A society constantly needs new ideas, inventions and commercially successful innovations, starting from individuals-innovators, through small and medium companies, large corporations and also from researchers and other persons directly or indirectly involved in scientific and technological development. Various individuals, a private person, a researcher or a research team, a corporate employee or a product development team, may come up with an invention. An inventor or a researcher is often alone with his

invention: he needs advice, support and appropriate network. An employee as an inventor may have a large organization and many specialists around him. The enterprise may also have the requisite resources to bring the invention rapidly on to the market.

Continuous improvement in manufacturing and all business processes is needed to achieve business excellence of the companies. The official procedures related to innovative activities, as a rule, are regularly included in Total Quality Management (TQM) in all advanced companies today. Peters, in the book "In search of excellence", underlines the need to break old habits and to introduce a new style of entrepreneurship, stressing the importance of systematic approach to innovation, with the aim of achieving excellence in business. Accordingly, when the level of a businesses efficiency and success is considered these days, the importance of innovation and acceptance of TQM strategy has almost a decisive significance.

2. CREATIVITY

Innovation begins with the generation of a new idea. The ability to generate new and useful idea is called creativity. Innovative process and new product must be different from the processes and the products previously produced. By definition, it cannot be simply the next logical step in development or improvement of an existing product or services. The product could be new to the person who made it but known to everyone else. In this case, we would call it reinvention. The most creative process and product is supposed to be new to innovator, to the local audience level, and the broader societal level.

The most important intellectual ability for creative thinking includes the ability of an individual to look at some problems in

unconventional way, the ability to analyze and conclude which ideas are worth of efforts required, and which are not, the ability to articulate a idea to the others and convince the relevant people that an idea is a worthwhile of resources needed. The most creative individuals prefer to think in a new, unique ways selected by them, and have the ability to distinguish between important and unimportant of ideas. Most important condition for creativity includes a person's confidence in his capabilities, tolerance for ambiguity, and willingness to overcome obstacles and readiness to take reasonable risks in looking for a new solution. The sense of strong self-motivation has also been shown to be very important to creativity. That is, individuals are more likely to be creative if they are involved in solving problems they have selected personally, they are genuinely interested in, and enjoy highly motivated to achieve the result.

A creative potential of an individual often depends and requires an environment that provides support and rewards for creative ideas. The companies culture, its organization's structure, standard procedures, flexibility and incentives, could discourage or could significantly increase innovators efforts and motivation.

There are many methods used by the companies to encourage the creativity of its individual employees. The suggestion box, employee driven idea system (EDIS), whereby employees submit their ideas and track progress from the initial concept to the full implementation, are widely used in many companies in order to make an effective use of potential inventors. Many companies discover and use creative potential embedded in employees. Creativity training programs encourage managers to develop verbal and nonverbal cues that signal employees that their thinking and autonomy is respected. The program often incorporate exercise that encourage employees to use creative mechanisms such as developing alternative

scenarios, using analogies to compare a particular problem with another problem that shares similar features or structure, with an idea to restate the selected problem in a new way.

Analysis of personality traits of inventors enables to mark the individuals which are likely to be interested in theoretical and abstract thinking, and have an unusual enthusiasm for problem solving, but they are more interested in problems identification than to the solutions themselves. Such individuals may spend a lifetime developing numerous creative new ideas, though less interested in patent creation and/or in its commercialization. Perhaps the most important characteristics – they are not highly specialized in the field in which they invent. They are interested in several fields simultaneously, which enables them to have a different perspective considering the problem.

3. UNMET NEEDS OF USERS – SIGNIFICANT SOURCE OF INNOVATION

Users often have a deep understanding of their unmet needs and the incentive to find ways to fulfill them. Users may alter the features of existing products, approach existing manufacturers with product design suggestions, or develop new products themselves.

4. RESEARCH AND DEVELOPMENT IN THE COMPANIES

Many companies have made great efforts in research and development (R&D). Hence, its work and results are a powerful source of innovation these days. A company's devotion to R&D has a strong positive correlation with its sales of new products and profitability.

The primary sources of innovation nowadays are discoveries in basic science and research, which is translated into commercial applications and demand of potential end-users. Of course, R&D staff in the companies are highly prepared and motivated to develop new products in company's efforts to respond to customer problems or suggestions.

Most current research suggests that companies which are successful innovators utilize multiple sources of information and ideas, including:

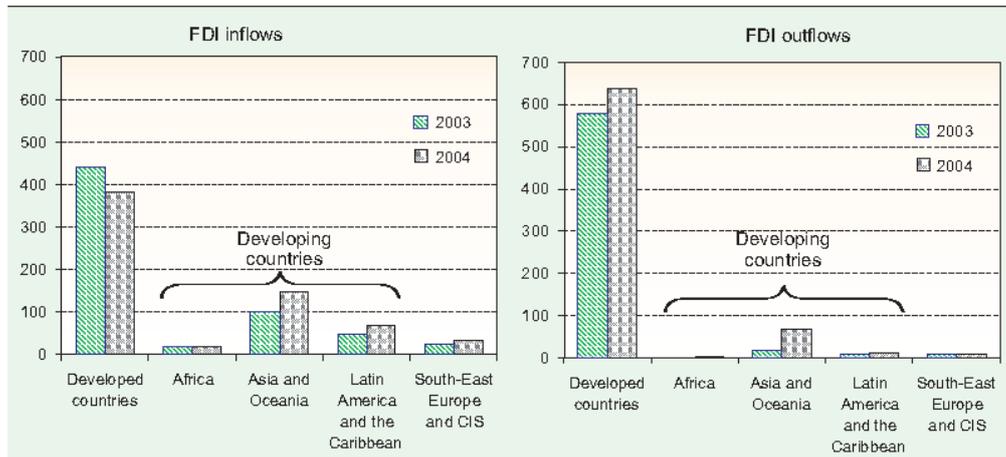
- In-house research and development, including basic research;
- Linkages to customers or other potential users of innovation;
- Linkages to external network of firms that may include competitors and suppliers;
- Linkages to other external sources of scientific and technical information, such as universities and government laboratories.

These companies often form strategic alliances with customers, suppliers, and competitors to work on innovation project or to exchange information and other resources in pursuit of innovation. Collaboration might occur in form of alliances, participation in research, licensing arrangements, contract research and development and other arrangements. The participants in these alliances can pool knowledge and capital and they can share the risk of new product development project. The most frequent collaborations are between firms and their customers, suppliers and local universities.

Firms often use external sources rather than investing in original basic research. Doing in house R&D helps to build the firm's absorptive capacity, enabling it to better adoption and utilization of information obtained externally. Absorptive capacity refers to the firm's ability to understand and use new information.

The level of foreign direct investment (FDI) is linked to the quality of business environment, the availability and productivity of a skilled labor force and other factors. The World Investment Report highlights the growing tendency towards internationalization of R&D

functions by major transnational corporations (Tics). Investors are not only looking for opportunities to reduce their production costs, utilizing cheaper labor in LDCs (less developed countries), but are increasingly investing in competitively priced, research-intensive activities there.



Source: UNCTAD, *World Investment Report 2005: Transnational Corporations and the Internationalization of R&D*, figure II.1.

Figure 1 – Level of foreign direct investment

The share of host developing countries in the global R&D systems of Tics is rising, but unevenly. Only a few economies have attracted the bulk of the R&D activity. Developing Asia is the most dynamic recipient. In the case of R&D expenditures by majority-owned foreign affiliates of United States Tics, for example, the share of developing Asia soared from 3% in 1994 to 10% in 2002. The increase was particularly noticeable for China, Singapore, Hong Kong (China) and Malaysia. In the foreign R&D activities of Swedish Tics, the share of countries outside the Triad more than doubled, from 2.5% in 1995 to 7% in 2003. Survey findings and other data for Germany and Japan support the growing import-

ance of developing countries and some economies in transition as locations

for Tics' R&D. Of 1,773 FDI projects involving R&D worldwide during the period 2002-2004 for which information was available, the majority (1,095) was in fact undertaken in developing countries or in South-East Europe and the CIS. Developing Asia and Oceania alone accounted for close to half of the world total (861 projects). A survey of the world's largest R&D spenders conducted by UNCTAD during 2004-2005 also shows the growing importance of new R&D locations. More than half of the Tics surveyed already have an R&D presence in China, India or Singapore. In South-East Europe and the CIS, the Russian Federation was the only significant target economy mentioned by the responding firms as hosting R&D activities.

Current foreign locations of R&D in the UNCTAD survey, 2004 (%):

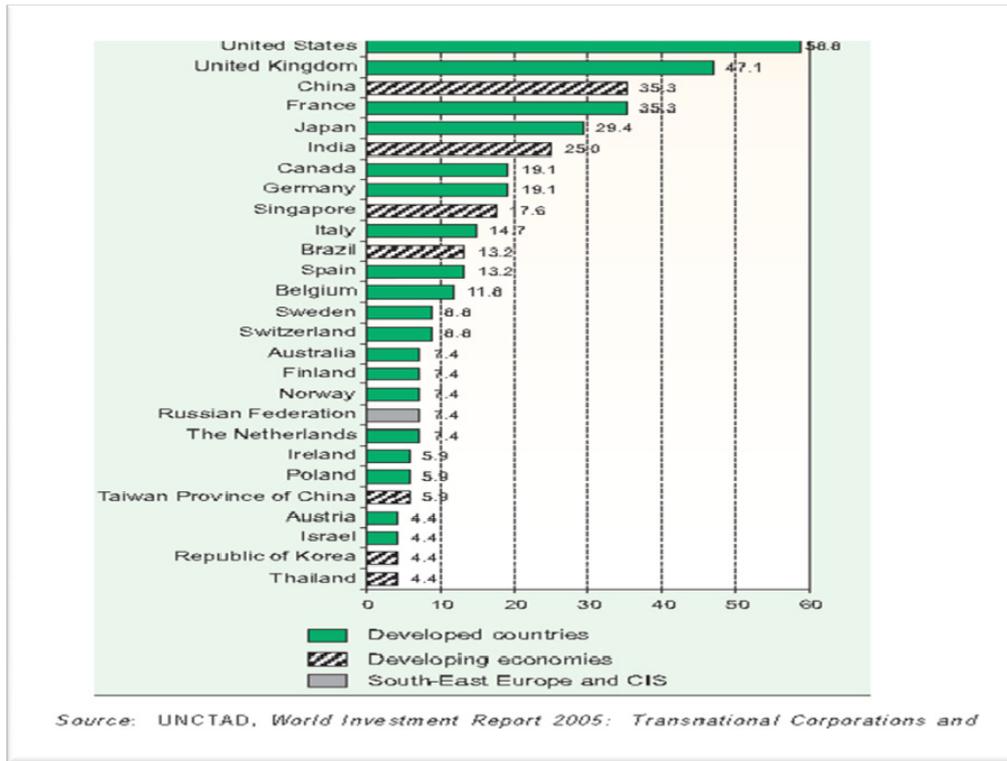


Figure 2 – Ulaganja u R&D

5. UNIVERSITIES

The role of universities in the innovation process has increased continuously over time because the development of new products or technologies depends increasingly on the findings of university (scientific) research. Universities could help facilitate interaction between owner organizations and design and construction firms worldwide and be responsible for performing multidisciplinary research in several areas ripe for innovation related to new technologies, financing and funding strategies, contracting approaches, project management techniques, safety, and quality. To increase the degree to which university research leads to commercial innovation, many universities have established technology transfer offices.

While the revenues from the university technology transfer activities are still quite small in comparison to university research budgets, their importance is growing rapidly. Universities also contribute significantly to innovation through the publication of research results that are incorporated into the development efforts of the organizations and individuals.

6. GOVERNMENT FOUNDED RESEARCH

Consideration of the domain of the science on business organization introduced the notion of business space. The overall business space is divided in 4 stratum: 1) in the business system, 2) in the economic system of the state, 3) in international business space and 4) in the

cosmos. Experiences in Japan have stressed the importance of stratum of business space in the economic system of the state. When considering the problem of innovation and excellence, it is obvious that there are important subjects for research at the business centers of excellence and quality incubators (of course, in conjunction with technological and business incubators).

Many governments actively invest in research through their own laboratories, the formation of science parks and incubators. Investing in developing science parks to foster collaboration between national and local government institutions, universities and private firms is increased. The science parks often include institutions designed to nurture the development of new businesses that might otherwise lack access to adequate funding and technical advice (in incubators). Incubators help to overcome the market failure that can result when a new technology has the potential for important societal benefits, but its potential for direct returns is highly uncertain. Such centers also help university researchers to implement their scientific discoveries in commercial applications.

Collaborative research is especially important in high-technology sectors, where it is unlikely that a single individual or commercial organization will possess all of the resources and capabilities necessary to develop and implement a significant innovation. Sometimes, geographical proximity appears to play a role in the formation and innovative activity of collaborative networks. Clusters often encompass an array of industries that are linked through relationships between suppliers, buyers and producers of

complements. One primary reason for the emergence of regional clusters is the benefit of proximity in knowledge exchange. Although advanced information technologies made it easier, faster, and cheaper to transmit information to the great distances, several studies indicate that knowledge does not always transfer readily via such mechanisms. Firms that are proximate thus have an advantage in sharing information that can lead to greater innovation productivity. Successful firms also attract new labor to the area and help to make the existing labor pool more valuable by enabling individuals to gain experience working with the innovative firms. The increased employment in the region can lead to the improvements in infrastructure (such as roads and utilities), schools and other markets that serve to the population.

7. CONCLUSION

An innovation can arise from many different sources. It can be originated by individuals, research efforts of universities, laboratories and business companies. The primary engines of innovation are the companies, because they typically have greater resources than individuals. The companies also have strong incentives to develop new products and services. More important source of innovation does not arise from any one of individual sources mentioned, but rather through the linkages between them. Network of innovators, that leverage knowledge and other resources from multiple sources, are one of the most powerful agents of technological development.

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