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INNOVATIVE SMALL AND MEDIUM-SIZED ENTERPRISES IN THE KNOWLEDGE-BASED ECONOMY

Inovativna mala i srednja preduzeća u ekonomiji zasnovanoj na znanju

Abstract

The contribution of innovative high-tech and knowledge-based SMEs to economic growth, employment and competitiveness is significant in developed countries. Innovation-oriented SMEs occur as a unique source of diversification, flexibility and long-term improvement of innovative system performances. They play a key role in discovering and developing new markets and expanding their supply in existing markets. These enterprises test, explore and push the boundaries of production and consumption, search for new ways to meet consumers' needs, and are a driving force of total economic growth and crucial factor in creating new employment. The role of technology-oriented SMEs in the economic development and in creation of employment largely depends on the existence of a favorable business environment, entrepreneurial culture, supporting activities and technical infrastructure, as well as the availability and accessibility of key resources (skilled labor, funding opportunities, etc.).

Keywords: *innovation, innovativeness, small and medium-sized enterprises, knowledge-based economy*

Sažetak

Doprinos inovativnih visokotehnoloških i na znanju zasnovanih MSP ekonomskom rastu, zapošljavanju i konkurentnosti značajna je u razvijenim zemljama. Mala i srednja inovativno orijentisana preduzeća se javljaju kao jedinstveni izvor diverzifikovanosti, fleksibilnosti i dugoročnog poboljšanja performansi inovativnog sistema. Ona igraju ključnu ulogu u otkrivanju i razvoju novih tržišta i proširivanju ponude na postojećim tržištima. Ova preduzeća testiraju, istražuju i pomeraju granice proizvodnje i potrošnje, tragaju za novim načinima kako da zadovolje potrebe potrošača; pokretač su ukupnog ekonomskog rasta i bitan faktor u kreiranju nove zaposlenosti. Ostvarivanje značajnije uloge tehnološki orijentisanih MSP u ekonomskom razvoju i stvaranju zaposlenosti u velikoj meri zavisi od postojanja povoljnog poslovnog okruženja, preduzetničke kulture, podržavajućih aktivnosti i tehničke infrastrukture, kao i raspoloživosti i dostupnosti ključnih resursa (kvalifikovane radne snage, mogućnosti finansiranja i dr).

Ključne reči: *inovacije, inovativnost, mala i srednja preduzeća, privreda zasnovana na znanju*

Introduction

Knowledge-based economy is characterized by strong development of manufacturing and service enterprises whose operations are based on knowledge and new technologies. In the knowledge-based economy, technology and knowledge are becoming increasingly complex, with growing importance of and possibilities for connecting enterprises with other companies and research organizations [9, p. 28]. Such an environment creates opportunities for new knowledge acquisition and development, implementation and diffusion of innovation, leading to further development of productivity as well as improvement of competitiveness of the high-tech sectors and the economy as a whole [16, n.d.].

Technology-intensive enterprises are often referred to as high-tech enterprises. These enterprises are vital to the competitive position of the country because:

- they are associated with innovations and hence tend to achieve higher market share, create new products and services for the market and use resources more efficiently;
- they are associated with high value-added product manufacturing and success in foreign markets, allowing them to achieve higher productivity;
- research and development (R&D) activities in production enable positive spillover effects onto other economic sectors by creating new products and processes, often leading to an increase in productivity, business expansion and creation of well-paid jobs [2, p. 219].

The achieved level of development of enterprises in the high-tech sectors is a good indicator of whether the economy is based on knowledge. The most developed economies today are the economies whose enterprises from the high-tech sectors play an important role in and are the basis of the new growth, employment, productivity and competitiveness.

The increasing role of knowledge and the modern economy's dependence on knowledge, information and specific skills have caused a significant increase in the share of knowledge-based high-tech products and services in the structure of developed economies. OECD defined a knowledge-based economy as an economy which is directly based on the production, distribution and use of knowledge and information [10, p. 7]. The basis of its development consists of interactive processes that enable the creation and exchange of knowledge and innovations within and among enterprises and other organizations [21, n.d.].

The Document of the European Commission states that creation, use and commercialization of new knowledge and technologies have become essential in the global battle for the realization of competitiveness, and high-tech sectors have become the most important driving force of economic growth, productivity, environmental sustainability as well as the major source of high value-added and well-paid jobs [3, p. 151].

Innovations in the knowledge-based economy are very important because knowledge creation and exchange are not aims per se, but provide the basis for development and source of new innovations (whether technological, production, marketing or organizational innovations, business methods and models, etc.). The approach to innovations has been radically changed in the knowledge-based economy, as well as the innovation process itself. The approach which states that innovation is based on technological research and exchange of technology among enterprises (the so-called closed innovation system) has been replaced by encouraging innovations that take place within a broad network of innovative cooperation (joint development, knowledge and ideas exchange, joint use of results, etc.) among various enterprises and other interested entities (institutes, laboratories, public and private development centers, etc.). In such a system, knowledge plays the most important role in encouraging and developing innovations. Most innovations are created by combining existing forms of knowledge. Knowledge has to be available in order to be turned into innovation; i.e. fast, easy and inexpensive access to large quantity and wide spectrum of knowledge is necessary. In addition to availability, transforming knowledge into innovations requires professionals who are able to apply available knowledge and create a new one [4, p. 3].

Numerous manufacturing and service industries have increased the use of knowledge-based technologies in their production and service providing. Innovations are

not just associated to high-tech enterprises that produce radical new products and services. Innovations occur in all enterprises, including companies in traditional manufacturing and service industries. Ever-increasing need for innovations has led to increased investment in innovative activities and capacities.

Innovative enterprises

An innovative enterprise can be defined in several ways. According to the basic definition, innovative enterprise is an enterprise that has realized at least one innovation, while product or process innovator is defined as an enterprise that has introduced either product innovation or process innovation [22, n.d.]. Innovative enterprises are those that have introduced an innovation during the observed period, where the innovation does not have to achieve commercial success. Innovative enterprises can be divided into two categories. The first category consists of enterprises which develop innovations independently or in cooperation with other enterprises or public research organizations. The second category consists of enterprises which innovate mainly by taking innovation (e.g. new equipment) developed by other enterprises. We can also distinguish innovative enterprises according to the types of realized innovations. Accordingly, there are innovative SMEs that have realized new products or processes, new marketing methods or organizational changes [27, p. 28].

Innovation-active enterprises are those enterprises that have had innovation activities during the observed period, including both ongoing and abandoned innovation activities. In other words, enterprises that have had innovation activities during the observed period, regardless of whether the activity resulted in the implementation of innovations, are innovation-active. Potentially innovative enterprises are a type of innovation-active enterprises that have made innovation efforts, but have not achieved innovation results [13, p. 47]. This is a key element of innovation policies that are aimed at encouraging, facilitating and helping enterprises to be innovative.

Also, there are other ways of defining and classifying innovative enterprises depending on the research needs. Distinguishing between enterprises according to innovativeness could be used in order to determine the percentage of enterprises (by size, sector, country, etc.) representing each of the four types of innovations, or the percentage of enterprises that have realized combined innovations, such as product and marketing innovations or process innovations and organizational innovations. Classification by innovative status can also include other data, such as data on the creators of innovations. Thereby it can be determined which enterprises developed innovations independently, which enterprises developed innovations in cooperation with other enterprises and/or research organizations, as well as which enterprises took finalized innovative solution. Enterprises may perform innovation activities in the observed period without actually realizing innovation. Innovation activities are all activities involved in development or implementation of innovations, including those that are planned to be realized in the future. In the observed period, innovation activities can:

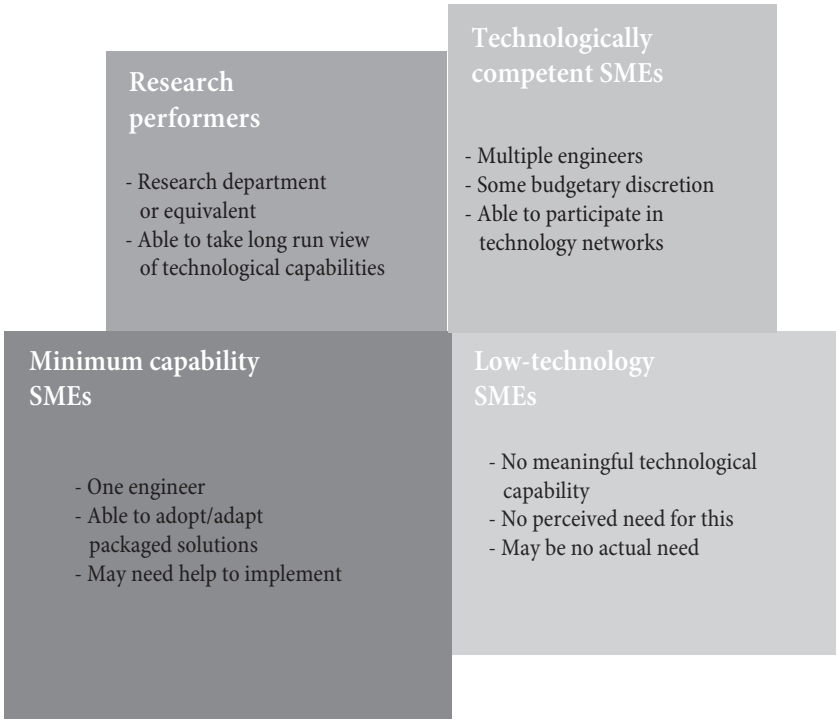
- be successful and result in successful implementation of innovation (although the innovation does not have to be commercially successful);
- be ongoing and include all innovative activities that are in progress and have not yet led to the implementation of innovation;
- be abandoned, i.e. innovative activities that are abandoned before the implementation of innovation.

Enterprises without innovative activities are those enterprises that do not have innovative activities in the observed period at all. In survey research on innovativeness of these enterprises, they answer only to a limited number of the research questions that relate to the reasons for the lack of innovative activities (e.g. What factors make it difficult to innovate? Is there patent protection? And so on.) [22, n.d.].

Innovative SMEs – classification and importance

According to characteristics of innovativeness, manufacturing SMEs can be grouped into several categories: from low-tech SMEs through SMEs with the minimum of technological capabilities, technologically competent SMEs, to SMEs able to independently and successfully carry out research in order to create a new innovation (Figure 1).

Figure 1: Hierarchy of enterprises by technological intensity



Source: according to [1, p. 21]

For the purpose of statistical monitoring by Eurostat, enterprises can be divided into three groups by innovation activities:

1. enterprises that create product innovations and/or process innovations (without innovations in the field of organization and/or marketing);
2. enterprises that innovate in the organization and/or marketing (without product and/or process innovations);
3. innovative enterprises that have developed both product/process innovations and organization/marketing innovations [23, n.d.].

In countries that are innovation leaders, the share of enterprises that develop both product/process innovations and organization/marketing innovations is higher compared to other less innovative countries.

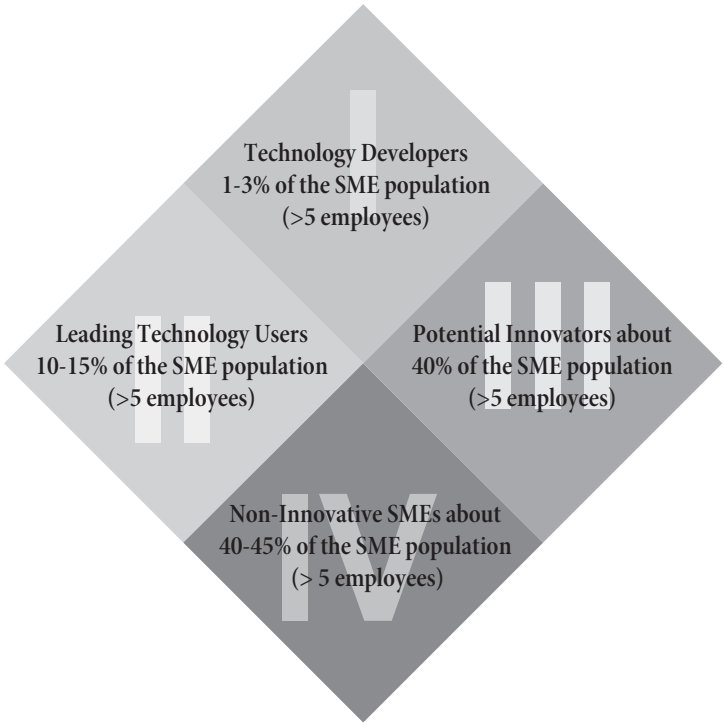
SMEs represent a large and very heterogeneous group of companies in terms of innovative capacity, motivation for innovation, innovation activities and innovation results. Accordingly, SMEs can be classified into four main groups: technology developers, leading technology users, potential innovators and non-innovative SMEs (Figure 2).

SMEs that are technology developers and leading technology users innovate actively and constitute less than 20% of SMEs population. About 40% of SMEs population have the potential to be innovative and are potential innovators; about 40-45% of SMEs are non-innovative enterprises.

Technology developers (innovation leaders) are SMEs which are focused on innovations, have sufficient capacities required and base their development and operations on development of new superior products and services. Usually they are small and young enterprises. Technology developers can be divided into two basic groups. First group consists of high-tech SMEs (most often they are companies with high potential for rapid growth) [12, p. 9].

The second group of innovative SMEs consists of small and medium-sized enterprises which are the leading (first) technology users. These companies do not have the capacity to be technology developers but their survival is based on the rapid implementation of new knowledge and technologies, thereby providing better commercialization of innovation results. Enterprises in this group can be divided into two main subgroups: SMEs with sufficient R&D capacity to create innovations independently and

Figure 2: Two-dimensional plot of SMEs according to their innovative capacity



Source: according to [12, p. 20]

SMEs that rely more on R&D capabilities and innovation results of others. Some of the main characteristics of these enterprises are:

- they employ a significant number of highly educated experts;
- they introduce at least one new product on average;
- they care about the satisfaction of consumers and recognize the value of market research;
- they are willing to cooperate with other companies:
- they rarely receive subsidies;
- they rarely have their own patents [12, p. 9].

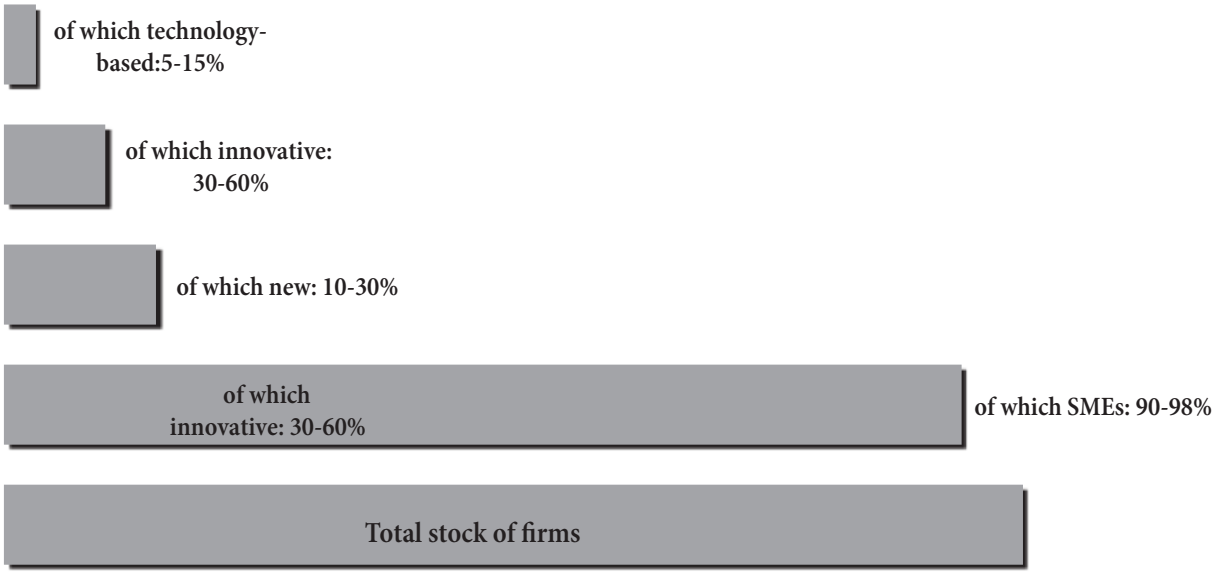
The third group consists of enterprises that are potential innovators. It is a large group which makes up about 40% of all SMEs. These enterprises are not too innovation-oriented; they exist for many years and are positioned in the market; they usually operate in traditional industries where technological change is not too rapid and radical; they actively follow the most important innovations and adopt them. Development of innovations is not the focus of their development strategy, but they actively follow innovation trends in the market and will be willing to develop and implement innovations if an opportunity arises.

The fourth group consists of SMEs that do not have ambitions, capacities, capabilities and a need to innovate. These SMEs are old and well-established in the market, mainly in the low-tech manufacturing industry, whose survival is not threatened by rapid technological development. They often use old production processes, rarely cooperate with other enterprises, have no significant development activities and rarely launch new products.

Classification of SMEs according to the innovation potential is significant because enterprises from different innovation groups have different needs for innovation and encounter a variety of challenges and problems in their innovation activities. It is possible to increase innovation capabilities of SMEs through creation of innovation policy, only if we recognize and take into account heterogeneity of innovation capabilities and needs of SMEs. This means that measures and instruments of innovation policy must be adjusted to each particular group of SMEs, taking into account their goals, capabilities and need for assistance in innovation activities.

The importance of small innovative enterprises (including new technology-based enterprises) in the

Figure 3: Share of new technology-based enterprises in the OECD countries



Source: according to [11, p. 31]

knowledge-based economy can be seen in the example of OECD countries.

Research findings are as follows:

- Between 30 and 60 per cent of all SMEs in the OECD countries (90-98% of the total stock of firms) can be characterized as innovative, but only a relatively small share (approximately 10%) is technology-based.
- Between 10 and 30 per cent of all SMEs (9-29% of the total stock of firms) could be categorized as new enterprises, where new is defined as less than five years old.
- New technology-based enterprises account for relatively small share (1-3% of all firms) [11, p. 31].

Summary of empirical research

The importance of innovative SMEs has increased over the past few years. The experience of the most developed countries indicates importance and capabilities of SMEs in developing innovations. Many studies show that size of an enterprise does not matter much to the R&D intensity and innovation efforts and that in certain industries SMEs have an advantage in terms of innovation development. These findings are confirmed by the fact that of the 70 most important inventions of the 20th century, more than half came from individual inventors, whose innovative entrepreneurial spirit created products such as: personal computers, jet engine, helicopter, color photographs, pen, radar, missiles, cellophane, DDT, streptomycin, biosynthetic insulin, etc. [5, p. 31]. Also, 46 of 58 major inventions in the United States and Western Europe in the twentieth century belong to individuals and small enterprises. According to the US National Science Foundation, small enterprises in the United States are 2.5 times more innovative and 24 times more efficient in their innovations compared to large enterprises (for enterprises with up to 500 employees, each dollar invested in scientific research yields 24 times more new inventions than for large enterprises with more than 10,000 employees), and innovations are commercialized one year faster, with costs lower by 25% [28, p. 7].

Flexibility, simple organizational structure, low risk level and practicality of SMEs are essential characteristics that enable them to be innovative [6, n.d.]. Hausman points out that closer relationships between the small enterprises' owners and consumers can positively affect their innovativeness because they can get better and faster insights into the consumers' needs. Absence of cumbersome bureaucracy and presence of more informal relationships within an enterprise can improve trust and communication within the organization and create a sense of belonging and cooperative competition, thereby positively contributing to innovativeness within SMEs. Also, the owners (managers)

of SMEs have more operational knowledge which (combined with a good knowledge of consumers) can and should be transformed into innovative solutions [7, n.d.].

Empirical research suggests that not all SMEs have the same level of innovativeness and the potential to be innovative. Different levels of innovativeness of SMEs are reflected in the fact that few highly-innovative and fast-growing SMEs contribute more significantly to innovative development than majority of other SMEs that are not so innovation-oriented. The age structure, size and sector specialization of enterprises are the key to understanding innovation within SMEs. Therefore, it is useful to distinguish innovations in high-tech SMEs, innovations in knowledge-based services and innovations in young innovative enterprises. That is why there is a clear distinction between these groups of SMEs in the literature and policies that support development of innovativeness. SMEs from each group innovate differently and are of different significance for the development of innovations. On the one hand, there are few highly-innovative and fast-growing SMEs that tend like pioneers to push existing boundaries significantly and create new value for consumers through innovative development (they are focused on knowledge, technology and innovation). On the other hand, there are SMEs that survive and develop by focusing on gradual improvements (incremental innovations) and their careful introduction to the markets.

In the past few years, special emphasis has been given to the establishing and role of the new (young) innovative SMEs that are believed to play critical role in development, diffusion and implementation of innovations. New and existing dynamic innovative SMEs contribute significantly to overall productivity of the economy by squeezing out less innovative and less productive enterprises, thus increasing the development and competitiveness of the economy as a whole. The new spin-off investments allow commercialization of knowledge, and its realization would depend on decisions, interests and development strategies of large enterprises, universities and research organizations.

In the case of Italy, Pellegrino et al. have concluded that intensity of innovation in young innovative SMEs depends mainly on the types of technical changes that have occurred outside the enterprise. By contrast, the older enterprises rely more on innovative solutions developed within the enterprise [18, n.d.]. Schneider and Veugelers have used German example to show that SMEs that combine novelties, limited supply and high R&D intensity achieve significantly higher sales of highly-innovative products compared to other innovative enterprises, especially when it comes to innovative products that are new in the market [20, n.d.]. Also, the regional dimension and the business environment are important factors that determine the success of the young innovative SMEs, whether they are high-tech manufacturing SMEs or service knowledge-based SMEs. Various studies have shown that SMEs on average do not tend to be more innovative when their size is reduced, but become more active in the realization of innovations. Innovative SMEs play an important role in the exchange of knowledge within the innovation systems, not only as users of knowledge but also as a source of new knowledge.

Innovation in SMEs is a continuous process which plays more important role in the economic growth and development of innovativeness in the economy than is commonly recognized. In addition to new, radical and economically important innovations, innovations within SMEs also include introduction of improved products and services, new processes, appearance in new markets and new market niches, introduction of new or improved management system and organization, etc.

Although most of these innovations are internally oriented and significant only to those enterprises that introduce them, various studies show that only 6-10% of all innovations are based on new technologies and radical technological and other innovative breakthroughs. In fact, innovations in SMEs are often the result of enterprises' need to respond to changing consumer demands or obligation to implement new standards. Many SMEs innovate by taking actions to improve the business, but are not aware of it.

Advantages and disadvantages of SMEs compared to large enterprises

The majority of SMEs are more market-oriented and less research-oriented; faster in exploiting new opportunities

and chances for development in the market, more flexible, they adjust better to market requirements and are more focused on incremental innovations. The role of SMEs in the innovation process is determined by a number of specific factors relating to the technology itself, but also to the structure and requirements of the market. Unlike large companies which have more opportunities to attract financial, material and human resources and may perform innovative activities that require high capital investments (for their successful implementation, economies of scale is often necessary), SMEs play a more significant role in the innovations that are oriented toward segmented markets, as well as toward development of specialized products and services that complement the offer of large companies, thereby making the value chain in the economy complete.

SMEs have the ability to efficiently innovate and develop new products faster than large companies. O'Regan et al. point out that capacity of SMEs to meet the growing expectations of consumers is mainly based on their ability to innovate and deliver new products at competitive prices [15, n.d.]. However, as Todling and Kaufman point out, many SMEs still do not recognize available opportunities and advantages such as: flexibility to adjust products to the demands of consumers, fast responsiveness to changes in demand, etc. In fact, they emphasize that SMEs innovate differently from the large enterprises and that interactions among SMEs are more informal and based on trust [25, n.d.].

The inability of many SMEs to successfully transform the R&D results into innovation indicates that there are numerous obstacles and constraints to be overcome in the innovation process. O'Farrell and Hitchens come to the conclusion that SMEs are often unable or unwilling to operationalize new concepts and business practices because of the decisions of their owners (managers) or a lack of adequate resources [14, n.d.]. SMEs have less resources (e.g. funds for financing R&D activities) and generally encounter greater uncertainty and limitations in the innovation compared to large companies [26, n.d.]. Also, SMEs' disadvantages in performing innovation activities (compared to large enterprises) are reflected in the number and quality of researchers, management modes and techniques, communication and establishing efficient relationship with the environment, the inability to achieve economies of scale, low negotiation power in relation to other entities from the environment, insufficient strength in lobbying for obtaining government assistance to finance or co-finance innovative activities, etc. However, the biggest problem of SMEs in their innovative activities relates to the capability of financing those activities. Piatier indicates this problem by pointing out that the problem of R&D financing is particularly serious in new SMEs which do not have many successfully completed research projects that creditors would use as a proof and a guarantee that their investments will pay off [19, n.d.].

Compared to larger companies, SMEs rely more on their own informal, rather than formal, innovations. Also, although SMEs largely depend on innovations, they are less able to use only the external inputs than larger companies [24, n.d.]. SMEs are not just small versions of large enterprises, but rather they have their own laws and they not only lack the financial and human resources that large enterprises have enough of, but their management and reward structures are often completely different [7, n.d.]. Compared to large enterprises, communication within SMEs is easier, faster and closer. Many decisions are made informally, which significantly increases the speed and flexibility of decision-making and the speed of innovation development.

According to Paunović and Prebežac, the main advantages of SMEs over large companies are: reduced barriers caused by the hierarchy, greater flexibility in decision-making; faster feedback on needs of consumers and market; and easier establishing of partnerships with companies suitable for achieving synergistic business results [17, n.d.].

In the literature, there are some other views of the most significant advantages of SMEs in terms of business and innovations. According to Paunović and Prebežac, the most important advantages of SMEs are as follows:

- flexibility, sense of initiative, dynamism and agility in the management decision-making;
- absence of inertia that is typical for adjusting to ever-changing technology and market conditions;
- increased propensity for new, original innovations and technologies;

- absence of excessive bureaucracy and formalism in the organization of daily business and innovation process;
- high level of capability in providing diversified products and services in line with changes in demand and fast responsiveness to changes in economic conditions;
- relatively low capital intensity;
- rapid return on investment;
- production of SMEs largely coincides with the modern trends of individualization of demand [17, n.d.].

Conclusion

SMEs are the driving force of knowledge-based economy due to their multiple contributions to growth, technological development, employment, competitiveness and export. Through successful innovation, SMEs increase revenue, create new consumer needs (new market niches) and better satisfy existing ones. They also develop new technological and non-technological innovations, make connections and collaborate, thereby reducing the advantage of large companies that resulted from the size of the available resources and opportunities for achieving economies of scale. The ability of SMEs to innovate is of great importance because innovations provide a sustainable competitive advantage. Innovativeness of SMEs enables and encourages growth of SMEs at the micro level and of the industry in which they operate as well as of the economy at the macro level.

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