2.8 INNOVATIONS AS A NECESSARY PART OF COMPANY'S LIFE

Innovations – theoretical background: The term innovation is associated with the name of the Czech native J.A. Schumpeter. According to him, innovation is the basis of cyclical development of the economy. The reason for this is that innovation does not take place uniformly but periodically in cycles. The introduction of a certain innovation requires overcoming the so-called social resistance that stands in the way of all new, unverified and unconventional. In connection with innovation, he used the term "creative destruction", a state in which a company practices new combinations to develop new twists, while creating new and old ones disappear. In the 1930s, he focused on analyzing business conditions and defined innovation as a combination of developmental changes that went beyond renewal at the level of simple reproduction. It was based on developmental changes in production and on the market and classified five typical changes, which show development and introduction of new products, respectively. Original products with new properties, the use of new production techniques, production processes or new commercial security of production, opening of new markets, changes in the organization of production and its security and use of new raw materials or semi-finished products.

Economists' views on innovation vary. In general, we could define them as introducing a change that already combines facts, facts to create new products or services, and then to put them into practice, where innovation is associated with new ideas, ideas that are offered to customers and they perceive them as new, original (Freeman, 1982). The term innovation encompasses technical, design, manufacturing, management and business activities related to the launch of a new (or improved) product or the first commercial use of a new or improved process or management.

Porter (1990) perceives innovation as a process using new knowledge, processes and technologies to create new products as well as new and improved current products. According to Drucker, we can define seven such areas – traditional and proven sources of innovation opportunities. The opportunity to innovate can be identified both within the organization and in its external environment.

Other definitions refine the interpretation of the term innovation and indicate the increasing penetration of innovation into management and production theories and practices. Changes in industry, particularly in technological development, and their application in products, production processes and services are referred to as a common concept of innovation (Crawford, 1996). Basic elements of industrial innovation are basic knowledge and know-how, ideas that transform basic knowledge into new products, processes and services, high speed of implementation of ideas to market conditions. According to Bobrow (1987), innovation expresses a change in the original structure of a production organism, e.g. a transition to a new state of internal structure, a change in products, technology, means of production, organization and market structure. Changes can be quantitative and qualitative (ibid).

Innovation involves the use of knowledge to generate and apply a new idea that is beneficial (Cooper, 1998). Research on the definition of innovation has shown that in the context of innovation, the authors consider it as an application of a new idea,

improvement, new idea or inventiveness. The current notion of innovation shows that innovation is a key term for an entrepreneur, a manager. It emphasizes the global concept of innovation as a way of life of a company, which affects all components of the reproduction process (marketing, product and technology development, planning, production, sales, personnel training, management, etc).

Innovation, innovation process and economic growth: Some groups argue that innovation causes business cycles, others believe that innovation is a consequence rather than a cause of the business cycle. Schumpeter's research shows that innovation also affects the business cycle. Although not considered to be the inventor of business cycles, Schumpeter distinguished three basic types of business cycles, each with a group of innovations. These are short Kitchin cycles (lasting approximately 3 years or 40 months respectively), medium Junglar cycles (lasting 9-10 years), long Kondratiev cycles (lasting 50-60 years).

Each wave of the same order is composed of the sum of several waves of the lower order and together with a certain number of waves of the same order creates a wave of the higher order. Schumpeter, therefore, argued that the Kondratiev's waves were triggered by radical innovations that triggered entirely new industries. Since the Industrial Revolution, the world economy has gone through four Kondratiev's waves. The first K-wave, referred to as the period of industrialization, began in 1780 and ended in 1842. During this period, a radical innovation was the invention of a stationary steam engine. There was an expansion in the production and use of machines that were able to work with the power of steam engines. Production ceased to be dependent on watercourses as energy sources and industrial enterprises moved to cities. Stationary steam engine was used to propel ships and vehicles. Steam engines and working machines powered by them have gradually improved, their types, variants and generations have diversified.

The second K-wave, referred to by Schumpeter as the "steam and steel age", lasted from 1842 to 1898. The construction of public railways, the development of the steel industry and machinery for metallurgical production were considered radical innovations. The third K-wave started according to Schumpeter in 1898 and lasted until about 1950. He called this wave a period of electricity, chemistry and engines. The radical innovation was the expansion of power engineering, electrical engineering, cars and aircraft. The production was relieved of the dependence of the drive of the machines by steam engines, because the machines were equipped with their own electric motor. Since the 1950s, the fourth K-wave has begun. During this period, the expansion of semiconductor electronics, computers, and information and control electronic systems occurred. The end of the 20th century is considered the end of this wave.

In the mid-1990s, several American professors, especially Paul Romer and Brian Arthur, came up with a new theory of economic growth, which, unlike classical theory of economic growth, defines innovation not as a residual factor but as a decisive factor in economic growth. The national economy, which was based on the development of knowledge and the application of new knowledge in innovation, was called "information, respectively knowledge economy".

Businesses saw a rise in revenue, coupled with a recent technology revolution called the "digital revolution". The term "digital revolution" is not accurate for current technology innovations. Only the first computers of the pre-transistor period were based on the digital principle. This period was considered the beginning of the fifth K-wave, which is related to the development of private investment in the USA. It is characterized by significant technological changes, the advent of information and communication technologies, the use of various micro and nanotechnologies, the Internet, the development of telecommunications and multimedia. Experts predict that this long-term cycle in which we are currently living will last until approximately 2030 until the innovative potential of the fifth-wave trade unions is exhausted.

Despite the obvious importance of innovation, they were not given enough attention in some European Union countries, as reflected in the low number of patents compared to Japan, China or the USA. This is now changing and innovative business actors are being supported. In the long term, the goal is to increase R&D spending or investment in human capital, which is the basis of the innovation process. Investment in human capital through education and training has a direct impact on economic profit. The availability of quality human capital and the development of its potential play a key role in any economy. Regarding innovative enterprises, Germany was the largest in 2014 and 2012, of which 70% of their innovative companies were small enterprises, 22% were medium-sized companies and 8% were large companies. According to the number of innovating companies per capita, there were in Germany (0.11%), Sweden (0.10%) and Finland in the Czech Republic (0.9%), Bulgaria (0.05%) and in the Slovak Republic (0.04%). According to the number of employees in innovative companies per country population, Germany (12.5%), Czech Republic (10.8%), Finland (8.9%), Sweden (8.7%), Slovakia (6,8%) and Bulgaria (5.9%).

According to the Community Innovation Survey 2012 on Investing Public Sources in Innovative Private Company Solutions, the most innovative were supported by EU resources in Germany (3,897). Around 71% of these companies received funding under the 7th EU Framework Program to support R&D, which preceded the HORIZONT 2020 Framework Program. In the Czech Republic, 1,354 enterprises were supported, only 19% of the 7th Framework Program. Each country also supports innovative companies from the state budget. In the Slovak Republic, the Office of the Deputy Prime Minister of the Slovak Republic for Investment and Information Technology continues to support young Slovak innovative firms using its hybrid financing model, which combines investments from public and private sources.

Technology transfer: It is an important tool for realizing innovative business. A technical discovery has the character of innovation only if it is evaluated by the entrepreneur and leads to an increase in the company's business revenues. The emergence of technology transfers dates back to r. 1980, when the Bayh-Dole Act was adopted in the US. This has enabled universities to exercise rights to the results of publicly funded research.

The basic conditions were that the university staff had a reporting obligation, the university had to file a patent application and shared the use income with the originator, while the research sponsor was entitled to a free license. The law has gradually inspired other states (Germany, Austria, Denmark, Norway, Japan, and Korea) to reform the rules for funding public research and the rights and practices related to the treatment of research results there are several meanings for the term technology transfer (TT) or the context in which it is used.

It is an effort to develop underdeveloped countries by providing technology (transfer) from more developed countries, transfer of technology in the commercial sphere between individual companies or within the company between its components, or transfer of technology from academia to the commercial environment. Patents also play an important role through which we can assess the effectiveness of spending on science and research. R&D is a major driver of innovation and R&D spending and intensity are two key indicators used to monitor resources devoted to science and technology worldwide.

All countries that are members of the European Union together reached a level of R&D spending of just over 2% in 2016. Overall, they spent more than 300 billion euros in this area. Research and development expenditure can be converted to a percentage of Gross Domestic Product (GDP) to achieve R&D intensity. The EU achieved an intensity of 2.04% in 2016. The research and development intensity of the European Union is low compared to South Korea, Japan, the USA or China.

In 2017, the Member States of the European Union spent almost 320 billion euros in total for R&D. Research and development intensity, e.g. R&D expenditure as a percentage of GDP reached 2.07% in 2017 compared to 2.04% in 2016. In 2007, R&D intensity was 1.77%. For the other large economies, R&D intensity in the EU was much lower than in South Korea (4.23% in 2015) in Japan (3.29% in 2015) and the United States (2.79% in 2015), while being about the same as China (2.07% in 2015) and much higher than in Russia (1.1% in 2015) and Turkey (0.96%).

R&D intensity above 3% is in Sweden, Austria, Denmark and Germany. In 2017, R&D intensity was highest in Sweden (3.33%) and Austria (3.16%), followed by Denmark (3.06%) and Germany (3.02%), with all R&D spending above 3% of GDP, while Finland (2.76%), Belgium (2.58%) and France (2.25% in 2016) R&D spending between 2.0% and 3.0% of GDP. At the other end of the scale, eight Member States recorded R&D intensity below 1%: Romania (0.5%), Latvia (0.51%), Malta (0.55%), Cyprus (0.56%), Bulgaria (0.75%), Croatia (0.86%), Lithuania and Slovakia (0.88%). In the last decade, R&D intensity has increased in the twenty member states with the highest growth in Austria (from 2.42% in 2007 to 3.16% in 2017 and Belgium (from 1.84% in 2007 to 2.58) In contrast, R&D intensity decreased in six Member States and the strongest in Finland (-0.59 pp) and Luxembourg (-0.33 pp), while in Malta R&D intensity remained at 0.55%.

Technology transfer is also a sign of the efficiency of spending on science and research. These are mainly patents and patent applications. E.g. Germany filed 15% of patent applications, the US 25%, Japan 11%, China 5% and the Republic of Korea 4%. At the global level, the Republic of Korea has seen a 13% increase in patent applications, 3.9% increase in Japan, and a +2.7% increase in US company registrations.

Diffusion of innovation: For an innovation to be successful, it is important to promote it, which is not easy. In addition to the unique idea and involvement of the product, price, location and sales promotion, the consumer itself, consumer behavior, consumer preferences and income levels play a very important role. The demand can be influenced to some extent, but the information about the goods must be directed to the right consumers. This problem was already addressed in 1962 by Everett M. Roggers, who formulated the theory of diffusion of innovation based on the results of 405 exploratory studies and published it in the book Diffusion of Innovations.

Diffusion of innovation is understood as a process in which innovation (a new idea) is communicated at a certain time through reliable channels between members of the social system. It is important to realize that something can be considered an innovation somewhere, and within another company this innovation can already be accepted. Base on this statement, Rogers defined five basic groups of intensity of adaptation to new technology. Innovators (2.5%) are a group that receives innovation in less time than other categories. Innovators are educated and courageous to take risks, but always count on a certain margin in their supplementary financial resources to cover the potential loss of non-profit innovation. They have the ability to understand and apply complex technical knowledge as well as the ability to cope with a higher degree of uncertainty about innovation. Fast recipients (13.5%) are usually young, successful people with higher education who have respect among their peers. They are an integral part of the local social system. They are characterized by the highest degree of opinion leadership. They are a model case for other members and society. The vast majority (34%) are more conservative, yet open to new ideas. They are active in society and have an impact on their surroundings. However, they are rarely in the position of opinion leader. Their decision-making before taking innovation is very careful. The late majority (34%) are older and less educated people, largely conservative and less socially active. They are under pressure among their peers, trying to catch up with their surroundings in innovation, but they consider innovation to be an economic necessity. They are skeptical, cautious, and cautious. Delays (16%) are very conservative, older and less educated people. They are usually isolated and without opinion leadership. They often compare with the past. They are suspicious of innovation, making their innovation decision-making process very lengthy. They usually have limited resources. These categories of innovation beneficiaries have evolved over years of research and observation of the diffusion process of innovation in various fields as well as social strata. Of course, there may be an exception in each group, but usually the distribution reflects the real state of adaptation of new products or technologies. Each person reacts differently in the way they hear information about innovation, how they try to understand innovation and ultimately accept or reject innovation. The diffusion process is the process of disseminating a new idea from the source of innovation or creation to the end consumers, respectively recipients. It occurs within the company as a group process.

Conversely, the adaptation process applies to individuals. It is a thought process in which an individual move from the first mention of innovation to the ultimate adaptation of innovation.

Consumers are an important player in the innovation process. In addition to consumers, governmental institutions, such as innovation policy makers and firms, need to innovate in order to be competitive. They are motivated by consumer interest, government policy. The motivation of the company to innovate is the higher the potential profits. These are, in turn, the higher the degree of competition in the sector. This influence of the degree of competition on innovation activity has already been described by Schumpeter (1911) and is therefore commonly called the Schumpeter effect (Aghion et al, 2005). Innovation policy is intended to create the preconditions for all actors in the state, with an emphasis on feedback between different parts of the system - both positive and negative – as well as links between technological and institutional changes. A well-functioning system significantly improves the chances of developing and disseminating technology (Hekkert, et al, 2006).

Conclusions: The whole innovation process is currently influenced by global development and the state of the environment. The development of industry started a process of significant changes in the sectors of agriculture, production, mining, transport and other industrial sectors. In the production process there was a shift from manual production in manufactories to large-scale factory production with the help of new energy sources (mainly coal at that time), thus increasing the division of labor and specialization. New scientific and technological discoveries have played an important role in this process. There has also been major social, cultural and political changes in most of the world.

The industrial revolution has brought economic growth, job creation and a rise in the standard of living of the population. However, the impact of a rapidly developing industry on the quality of the environment is gradually becoming apparent. Cyclic closed metabolism that occurs in natural ecosystems, partially disrupted and open in agro-systems, is later converted to a one-way metabolism with a one-way input of raw materials. Industrial production is characterized by energy-intensive technologies (Bartusek, 2013). At the same time, the quality of the environment is significantly deteriorating as industry and its individual sectors have an impact on all its components – air, water, soil, organisms. Industrial production is a source of pollutants, which have not only local impact, but they spread widely in the air and cause complex problems. Businesses should implement innovations that are consistent with sustainable growth goals but do not always bring enormous profits.

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