

## INNOVATION ACTIVITIES OF INDUSTRIAL ENTERPRISES AND THEIR IMPACT ON COMPETITIVENESS

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### Abstract

In today's busy world, industrial enterprises are trying to innovate not to lose their competitive advantage and to match the competition. The global environment makes constant innovation an imperative. Industrial enterprises are trying to innovate their products, processes or business strategy, which entail high costs. This paper explores the innovative activities of industrial enterprises, the costs associated with the introduction of these innovations and looks at the brand new innovative direction of the German economy in the industry.

**Keywords:** Innovation, competitiveness, costs, industry

### 1. INTRODUCTION

Enterprises that are trying to maintain and consolidate their market position should implement an appropriate innovation policy that would allow them to achieve a more favorable position compared to the competition. This competitive advantage may have the character of an offer in the form of array of improved products that better meet the needs and desires of customers or it may consist of cheaper production methods, i.e. innovations. Innovation is the culmination of a whole series of scientific, technical, organizational, financial and commercial activities, and together they make up the innovation process which consists of the inventive and the innovative phase. The innovations are preceded by certain activities, for example inventions, rationalization proposals, projects or industrial designs. These activities leading to changes in management structure are called inventions. Not all of these activities will also see realization. Some remain unfinished, others are meant to serve only the development of science and knowledge. We can call innovations only those results of scientific, research and development activities, which will also benefit realization. [1] The article analyzes the innovation activities in the Czech Republic in recent years, investments in technological and non-technological innovations, and demonstrates the growing importance of information and communication technologies.

### 2. INNOVATIONS

In the current globalized market, innovations from the aspect of an enterprise represent a core element for its further development and increased competitiveness. Innovation is closely associated with research and development (R&D), which provides the basis for the creation and implementation of innovations. The high costs and risks associated with the introduction of innovations mean that enterprises often invest less funding in innovation than is socially desirable. In this context, the Czech government has prepared a strategic document, "*National Innovation Strategy of the Czech Republic 2012-2020*", which focuses on innovation activities of enterprises in the country. [2]

The need for innovations occurs when the current medium-term or long-term plan does not achieve the desired enterprise objectives and sustain competitive advantage. Any innovation should contribute to the advantage of the strengths of the enterprise and to eliminate business risks. Innovations can be divided into four categories.

## 2.1. Innovations in production and services

Innovations in production and services represent the introduction of goods and services that are new or significantly improved with respect to the characteristics of their potentially intended use. This includes significant improvements in technical specifications, components and materials, software, user friendliness or other functional characteristics. [3,4]

## 2.2. Innovations in the business processes

Innovations in business (technological) processes reflect the implementation of new or significantly improved methods of production or supply relationships, they may involve significant changes in techniques, equipment and software. [3]

## 2.3. Organizational innovations

Innovations of an organizational nature reflect the introduction of new organizational methods in business practices, including the design of the new arrangement of the workplace. [3]

## 2.4. Marketing innovations

Marketing innovation is the introduction of a new marketing method not previously used by the enterprise and which is part of a new marketing strategy. It could mean a significant change in the design of the product in its packaging, product placement on the market through new sales channels, essentially changed product promotion using tools of the communication mix, new pricing strategy, etc. [1]

Experience shows that it is possible to successfully innovate in the traditional way, where the business or marketing department prepares the task, the development drafts the concept, the designers draw drawings and the process bills of material, and technologists draw the technological procedures and write the NC programs. At the end of the chain the result full of compromises horrifies not only the production workers but also merchants and consumers. The entire process marketing - product development - training - production ramp up must take place in a common multi-profession team and in parallel. This approach allows creating output with much higher quality in less time, says Ján Košturiak of the company IPA.

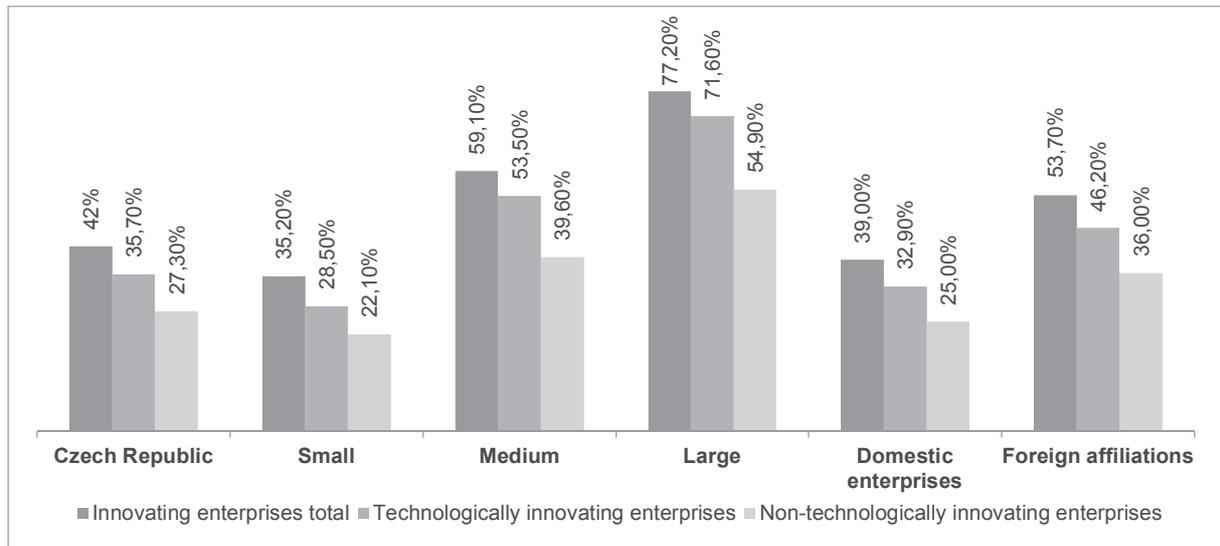
## 3. INNOVATION ACTIVITIES

According to the broader concept of innovation as described in the **Oslo manual** (OECD, 2005), there are four main types of innovations: product, process, marketing and organizational. Product and process innovation are together called **technological innovations** because they are closely associated with technology. On the other hand, marketing and organizational innovations are among the **non-technological innovations**.

### 3.1. Enterprises with innovation activities

To collect data on innovation activities of enterprises, the Eurostat harmonized model questionnaire was used for a uniform survey on Innovation CIS 2014 (Community Innovation Survey 2014) for the reference period 2012 - 2014. The following text is based on a series of tables and charts, which are based on CSO statistical surveys from 2014.

The most intensive innovators are large enterprises with more than 250 employees. During 2012 - 2014, up to 77.2 % were innovating. From the perspective of business ownership, more foreign owned companies innovated - 53.7% rather than domestic enterprises - 39%, see **Figure 1**. The most innovative sector of the manufacturing industry was the manufacture of other transport vehicles and equipment, with 74.4% of innovative enterprises. [2]



**Figure 1** Share of innovative enterprises in the total number of companies in a group according to the type of innovation activities [2]

Within their innovation activities, the enterprises engage in intensive technological innovation rather than non-technological innovation, see **Table 1**.

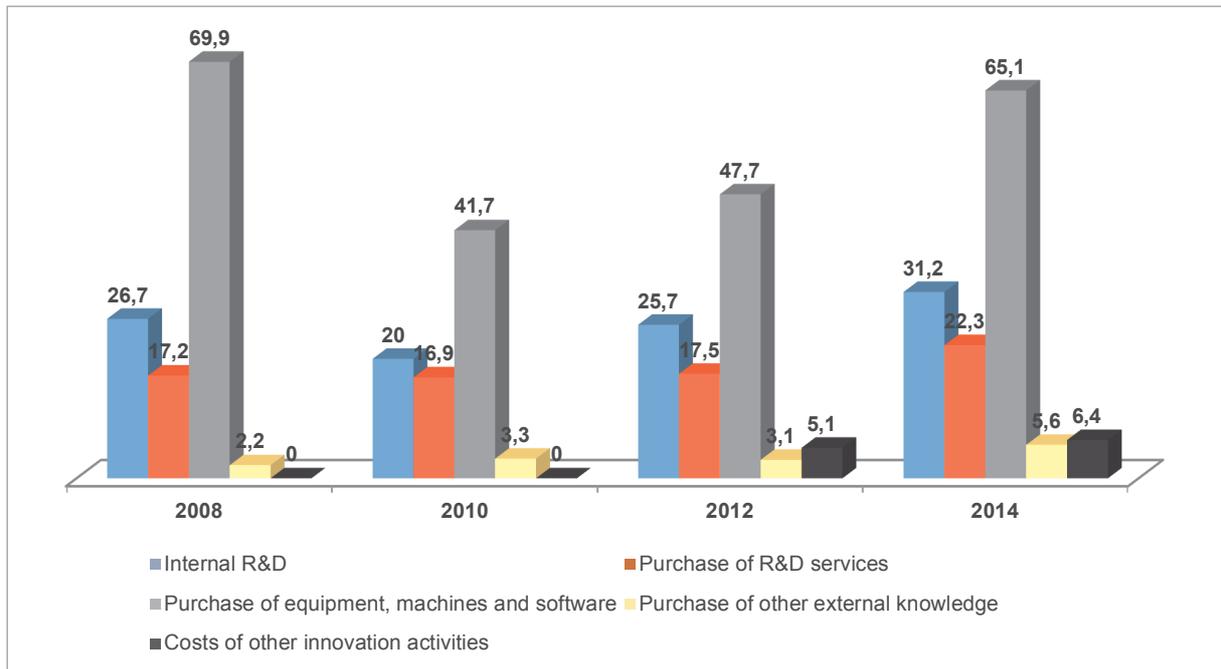
**Table 1** Innovation activities of enterprises by type of innovation [2]

NACE B+C+D+E+G46+H+J+K+M71-73	2008 - 2010	2010 - 2012	2012 - 2014
<b>Innovating enterprises total</b>	<b>51.7%</b>	<b>43.9%</b>	<b>42.0%</b>
<b>Enterprises with technological innovation</b>	<b>34.8%</b>	<b>35.6%</b>	<b>35.7%</b>
Enterprises with product innovation	9.5%	8.8%	10.5%
Enterprises with process innovation	8.2%	7.5%	7.7%
Enterprises with product and process innovation	14.7%	16.5%	14.6%
Enterprises with unfinished or stopped technological innovations	2.4%	2.8%	2.8%
<b>Enterprises with non-technological innovation</b>	<b>42.4%</b>	<b>31.6%</b>	<b>27.3%</b>
Enterprises with marketing innovation	11.5%	11.2%	10.1%
Enterprises with organizational innovation	12.8%	9.2%	6.8%
Enterprises with marketing and organizational innovation	18.1%	11.2%	10.4%

The largest share of enterprises engaged simultaneously both in the technological and non-technological innovations.

### 3.2. Costs on technological innovations

In 2014, the investments of enterprises in introducing innovations of products and processes were 131 billion CZK. This is the highest recorded rate of enterprise investment in technological innovation for the whole monitored period of innovation activities. The highest share of costs of technological innovations is attributable to investments in the acquisition of machinery, equipment, software and buildings. In 2014, the total enterprise investment related to technological innovations in the acquisition of equipment, software and buildings was 65 billion CZK, which is 49.9% of all costs on technological innovations. The aggregate enterprise costs on research and development was 53.5 billion CZK, of which on internal R&D 31.2 billion CZK, see **Figure 2**. [2]



**Figure 2** Costs on technological innovations, billions CZK [2]

The total cost for innovation activities related to technological innovations in 2014 amounted to 130.9 billion CZK. More than two thirds of this amount was invested by large enterprises - 86.6 billion CZK. [2] Big companies embody one of the most important actors of local and regional development. [5] The amount spent on technological innovation by medium-sized enterprises was 30.2 billion CZK. The investment of small businesses in technological innovation was 13.8 billion CZK. The investments of technologically innovating foreign affiliates in introducing innovations were almost double - 85.7 billion CZK that of the Czech enterprises - 44.9 billion CZK. [2]

#### 4. NEW ECONOMICS

The importance of information and communication technologies is growing and in many cases the value of companies dealing with ICT technologies is skyrocketing. Talk about the "new economy" has started, which will be based on the development of this segment. Considering the substantial dependence of the Czech economy on the economic development in Germany, it is useful to take a closer look at the strategic goals of that country which showcases the continued development of the industry as the "Industrie 4.0". [6]

The first industrial revolution brought mankind the steam engine and the first production machines driven by steam. The second industrial revolution is associated with the introduction of production lines and the expansion of the division of labor. The third industrial revolution introduced automation of production. The forthcoming fourth industrial revolution is based on the principle of automating everything that can be automated, linking not only production but also logistical and distribution systems, while ensuring high flexibility together with integrity. In this context we refer to several aspects of integration, so called horizontal and vertical. **The horizontal integration** represents very flexible production units involving both production networks inside the company as well as their links within the value chain, i.e. between the enterprises and in relation to the customers. The preconditions for mutual communication are single, common platforms. **The vertical integration** are the production equipment, machinery, material handling equipment and other production elements involved in the production network, communicating with each other. These are not autonomous, albeit automated workplaces, but integrated manufacturing systems. [6]

For the Czech Republic, with its character close to Germany, the above-mentioned German economic goals call for at least thinking about what direction the economy will take.

## 5. CONCLUSION

The enterprises must increasingly realize that product or service innovation, process innovation, organizational innovation or marketing innovation are the key in the tough competitive environment. The ability to improve the internal environment and engaging in appropriate forms of cooperation often determines the level of competitiveness of the organization. In 2014, the innovating enterprises invested into their product and process innovation the most since 2008. Half of the funds went to the acquisition of buildings, machinery, equipment and software. "Enterprises spent 31.2 billion CZK on R&D in relation to innovations. 22.3 billion was then spent on research and development services from other operators", said Iva Ritschelová, President of CSO. Overall in 2014, enterprises invested 2.4% of revenue in the development of their innovations.

To keep up with the leaders in the industry and to meet the needs of customers, we must spend large enough capital on innovation activities. This capital can be our own or foreign, but it is important to invest it efficiently and continue to seek funding for further development. Improvement of products or business processes can be achieved relatively inexpensively, through cooperation of enterprises with academia. Enterprises usually cooperate with a partner from the Czech Republic on the introduction of technological innovations, when the development of product innovation takes place mostly within the enterprise and only a few companies cooperate with a university or research organization. Up to November 11 of this year, a survey is running on cooperation between higher education institutions and the application sphere. The goal of this survey is to map the current situation and to help formulate measures to promote mutual cooperation. In the area of financing of enterprise development, the long-term programs to support innovative activities from the European Union also play a significant role. Today, innovation is an undisputed part of modern society and an essential prerequisite for long-term competitiveness, whether of individual companies, regions or countries.

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