



Tom 28/2018, ss. 83-93
ISSN 1644-888X
e-ISSN 2449-7975
DOI: 10.19251/ne/2018.28(6)
www.ne.pwzszplock.pl

Paweł Kaczmarczyk

The State University of Applied Sciences in Plock

INNOVATIONS IN THE POLISH ICT SECTOR IN THE YEARS 2014 – 2016

INNOWACJE W POLSKIM SEKTORZE ICT W LATACH 2014-2016

Summary

The objective of the research study is to analyse the level of innovativeness of the Polish ICT sector in 2014-2016. In the theoretical part of the paper, the objective has been justified and the concept, classification, and sources of innovations have been presented. The empirical part of the research study has been based on the data of the Central Statistical Office. This part presents analysis of the innovativeness level in the Polish ICT sector (taking into account product, process, organisational, and marketing innovations) in comparison to innovativeness of all enterprises in Poland. The analysis also includes revenues from the sale of new or significantly improved products in the Polish ICT sector compared to all Polish

Streszczenie

Celem pracy jest analiza poziomu innowacyjności polskiego sektora ICT w latach 2014-2016. W części teoretycznej pracy uzasadniono cel pracy oraz przedstawiono pojęcie, klasyfikację i źródła innowacji. Część empiryczna pracy została oparta na danych Głównego Urzędu Statystycznego. W tej części zanalizowano poziom innowacyjności w polskim sektorze ICT (uwzględniając innowacje produktowe, procesowe, organizacyjne i marketingowe) na tle innowacyjności wszystkich przedsiębiorstw w Polsce. Przedmiotem analiz były również przychody ze sprzedaży produktów nowych lub istotnie ulepszonych w polskim sektorze ICT na tle ogółu polskich przedsiębiorstw. We wszystkich przeprowadzonych analizach uwzględniono zatem

enterprises. Therefore, in the all carried out analyses, the results of all enterprises in Poland, the ICT sector as a whole (ICT production + ICT services), ICT production, and ICT services have been taken into account.

Keywords: innovations, ICT sector, sales revenues.

wyniki dotyczące ogółu przedsiębiorstw w Polsce, sektora ICT jako całości (produkcja ICT + usługi ICT), produkcji ICT oraz usług ICT.

Słowa kluczowe: innowacje, sektor ICT, przychody ze sprzedaży.

Introduction

Innovations are essential for socio-economic development and its growth. The economy cannot grow dynamically and effectively without innovations. That is why there should be a tendency to innovate within the society, and hence the tendency and ability to create new products (or improve already existing products) new technologies and organisations as well as the management and motivation systems. Innovation takes place only in the conditions of an unrestricted market mechanism with some marginal, corrective actions of the country implemented mainly by indirect methods. Only then, on all markets (labour market, goods and services market, currency market, long- and short-term loans market) there may be competition, which is a sufficient stimulus to implement innovation.

Innovations in the ICT sector are particularly important since this sector is crucial for socio-economic development. Technical and technological progress of each economy is based on the ICT sector. The ICT sector is characterised by a strong connection to other sectors, and its achievements in the field of new solutions result in increased benefits from other branches of the economy. Innovations in the ICT sector improve the functioning of other sectors of economic activity. Due to the above, the ICT sector is regarded as a strategic sector.

The objective of this study is to analyse the level of innovation of the Polish ICT sector compared to innovation of all Polish enterprises in 2014-2016. The analysis includes product, process, organisational and marketing innovations. The analyses have been based on data from the Central Statistical Office.

1. The concept evolution, classification and sources of innovation according to the selected authors

Many authors dealt with the problem of innovation. Among them, it could be mentioned, for example the following authors: Stefan Marciniak [2000], Peter F. Drucker [2015], Jan Fagerberg, David C. Mowery, Richard R. Nelson [2005], Helga Nowotny [2006], Peter Swann [2009], Everett M. Rogers [2003], Nigel King, Neil Anderson [2002], Stanisław Gomułka [1998], Andrzej H. Jasiński [1998], Józef Penc [1999]. This concept has been evidently evolving in time. American scholar Robert U. Ayres defines innovation as creativity in the economic sphere [Ayres, 1987]. Therefore, according to him, innovations are the following: new technological processes, new products, as well as inventions in the field of services or organisation of a new enterprise for the purpose of selling products or services.

However, Peter F. Drucker, find the innovation as a broader and different concept. This author presents innovation and entrepreneurship as a purposeful task - which can be organised and whose organising is needed - and as a systematic work. According to the author, innovation and entrepreneurship are part of the manager's task. In this approach, innovations are the tools of entrepreneurship that create new resources, that is, those resources which people find useful and give them economic value [Drucker, 2015].

Peter F. Drucker says that innovation does not have to be technical, what is more, it does not have to be anything what is material. An example of innovation (of great importance) not based on the use of a new technique are, among others: containers, handbooks, the position of a master (a highly qualified, senior worker), a student system combining the vocational training and school education. Few technical innovations have such impact, for example: newspapers, insurance or instalment purchases that are social innovations. The economy has been revolutionised especially by instalment purchases. Wherever they were introduced, the economy was driven by supply driven by demand almost independently of the production level of this economy. In turn, the hospital (social innovation of the Enlightenment) was more important to health care than many medical achievements. On the other hand, management (i.e. practical knowledge) enabling effective cooperation in the organisation of people with different skills and various knowledge is an important social innovation of the twentieth century. The practice of Japan proves the effectiveness of these and other social innovations. The Japanese were not considered in the West as innovators but as imitators. However, this

view is appropriate only in the field of technical innovation. The Japanese implemented a lot of social innovations (in the development of schools, universities, state administration, banks and relations with workers), which are much more difficult to achieve than, for example, building locomotives or creation of telegraphs. Japan implemented a very effective entrepreneurial strategy consisting in gathering resources on social innovations and imitating, importing and adapting technical innovations. Such behaviour was caused by the fact that institutions develop and effectively operate only when they are rooted in culture, while technology can be imported at low prices and with low cultural risk [Drucker, 2015]. Following the above examples, Peter F. Drucker states that innovation is a more economic or social concept than a technical one and can be defined as a change in yield from resources, or a change in the value of consumer needs through the use of specific resources. The more specific than the theoretical model determines which of these definitions is more appropriate. It can be mentioned that Jean B. Say defined entrepreneurship as a change in yield from resources, i.e. just like innovations were above defined [Forget, 2002].

To continue further considerations of Peter F. Drucker, it can be noticed that the mentioned author, wanting to emphasise the non-technical nature of innovation, believes that this concept does not necessarily mean research, because research is only one of the innovation tools [Drucker, 1995]. Therefore, according to him, innovation should be understood as follows:

- 1) always let go what happened yesterday
- 2) seek innovation possibilities within:
 - a) defects of technology, process and market
 - b) time to implement new knowledge
 - c) the needs and defects of the market
- 3) be ready for entrepreneurship
- 4) be ready to focus on creating new businesses rather than just new products or modifying old ones.

This author refers to the concept of creative destruction, which had been previously created by Joseph A. Schumpeter. The essence of this concept lies in destroying the existing structures and replacing them with the more effective ones. This process of “creative destruction” is a fact of fundamental importance to capitalism. This is what his essence ultimately contains and this is the factor determining the conditions for the functioning of each capitalist corporation. According to Joseph A. Schumpeter, innovations are

internal factors of economic development, which include new combinations of production factors, trade and organization [Schumpeter, 2003].

To sum up, the observations of the above-mentioned authors, one can say that innovation is a creative change in the social system, in the economic structure, in technology and in nature [Marciniak, 2000].

The global innovation criterion has been widely used until the end of 1970s. Joseph A. Schumpeter, Peter F. Drucker, as well as other modern authors found that innovation is a new invention used for the first time on a global scale. The suggestion to change the paradigm in the theory of innovation can be found, for example, in the article by Stephen J. Kline [1985] and the OECD report [1992]. According to the authors of the report, a significant number of important innovations goes through a lot of radical changes during their lives, and in practice the improvement, and thus imitation of innovation (the first implementation) can have even greater economic significance than the original invention. This understanding of innovation has been adopted in this research work.

When it comes to classification of innovations, we can distinguish the following innovations [Marciniak, 2000]:

- 1) anthropocentric innovations or innovations in the field of various manifestations of individuals' lives
- 2) social innovations regarding the organisation of interpersonal relations
- 3) biotic innovations appearing within the nature
- 4) technical innovations concerning changes in technics and technology.

As part of technical innovations, we can distinguish product and process innovations. On the other hand, there are organisational and marketing innovations within social innovations. Product innovation is the launch of a product or service that is new or significantly improved in terms of its features or usage. This includes significant improvements in terms of technical specifications, components and materials, embedded software, ease of use or other functional features. Process innovation means the application of new or significantly improved methods of production, distribution and promotion activities for products and services. Organisational innovation is the implementation of a new organisational method following the rules of operation adopted by the company (including knowledge management), in the organisation of the workplace or relations with the environment, which has not been used in the enterprise so far. Marketing innovation is the implementation of a new marketing concept or strategy that differs significantly from the

marketing methods which were used so far in the enterprise. Product, process, organisational and process innovations are the subject of analyses in the empirical part of this research work [GUS, 2017]. In the empirical part of the research study, product, process, organizational and marketing innovations have been analysed.

Sources of innovation can be divided into domestic and foreign and (from another point of view) to supply and demand sources. In the large and medium-sized countries, the national sources of innovation are the most important. National innovation sources include all human activities in the economic and social spheres. Foreign sources of innovation usually have a complementary role to domestic sources. The foreign source of innovation is the import of foreign scientific and technical achievements (for example new machines and devices, new technologies, new production organisation systems) and their application in the country. The basis for classification the sources of supply and demand for innovation is the question if one firstly creates a new solution whose application is searched in production or the question if finding a new solution is stimulated by a previously existing need in a specific field [Marciniak, 2000].

2. Results of analyses

In the years 2014-2016, almost one in six enterprises among all Polish companies implemented product or process innovations (Table 1). Among the companies included in the ICT sector, this was achieved by 24.7%, with more often production companies (39.4%) than those providing services (22.5%).

Table 1. Innovative enterprises by types of innovation introduced in the years 2014-2016

Specification	Total	Product innovations	Process innovations
		in %	
Total	16.4	10.0	13.1
ICT sector (ICT production + ICT services)	24.7	19.9	16.3
ICT production	39.4	29.8	27.0
ICT services	22.5	18.5	14.7

Source: [GUS, 2017, p. 30].

In the field of product innovations, one can also see such a hierarchy. Only 10% of all enterprises in Poland introduced product innovations, while as part of the ICT sector, such innovations were implemented by as much as 19.9% of these enterprises. The enterprises included in the production of ICT, which introduced product innovations accounted for 29.8% of all enterprises ICT production. On the other hand, within ICT services, enterprises that introduced product innovations accounted for 18.5% of all enterprises included in ICT services. When it comes to process innovations, the enterprises that introduced such innovations accounted for 13.1% of all Polish enterprises. Enterprises from the ICT sector constituted (in this aspect) 16.3% of enterprises from the ICT sector, whereas in the scope of ICT production and ICT services, the process innovation indicators were 27.0% and 14.7% respectively.

The difference between the percentage of enterprises in the ICT sector that introduce product or process innovations and the percentage of enterprises in total in this respect is 8.3 percentage points. The ICT sector prevails over Polish enterprises primarily in terms of product innovation. The prevalence in this case is 9.9 percentage points. In the case of process innovations, the prevalence of the ICT sector over the total number of enterprises is smaller and amounts to 3.2 percentage points. It can be clearly noticed that the ICT production has a higher prevalence over ICT services in terms of process innovations (12.3 percentage points) compared to product innovations (11.3 percentage points).

However, the hierarchy of relative frequencies, which were described above, does not fully reflect the relative frequencies concerning revenues from sales of new or significantly improved products (Table 2).

Table 2. Revenues from sales of new or significantly improved products in 2016

Specification	Products introduced on the market in the years 2014-2016		
	total	new to the market	only new to the enterprise
	in % of total sales		
Total	6.3	2.9	3.3
ICT sector (ICT production + ICT services)	11.4	3.8	7.6
ICT production	9.4	4.5	4.9
ICT services	12.0	3.6	8.4

Source: [GUS, 2017, p. 30].

In 2016, among the enterprises of the ICT sector, revenues from the sale of new or significantly improved products constituted 11.4% of revenues from sales of products, goods and materials. In 2016, the share of revenues from sales of new or significantly improved products in total revenues was therefore higher in enterprises of the ICT sector than in enterprises in total. The share of revenues from sales of new or significantly improved products in total revenues for all Polish enterprises amounted to 6.3%. The enterprises included in ICT services have gained in this scope a higher relative frequency (12.0%) in comparison with the enterprises included in ICT production (9.4%). This was also in the case for new products only for the company.

The analysis of organisational and marketing innovations in the ICT sector provides slightly different conclusions (Table 3).

Table 3. Enterprises which introduced organizational or marketing innovations in the years 2014-2016

Specification	Organisational innovations	Marketing innovations
	in %	
Total	8.6	8.3
ICT sector (ICT production + ICT services)	17.4	15.9
ICT production	16.1	14.3
ICT services	17.5	16.2

Source: [GUS, 2017, p. 31].

In terms of both innovations, enterprises from the ICT sector (which introduced these innovations) constituted a clearly higher percentage compared to the analogical relative frequency in the total group of companies, and more precisely in the years 2014-2016, the percentage of enterprises that introduced organisational and marketing innovations was twice as high among ICT enterprises than among all enterprises. The discussed relative frequencies for total enterprises and enterprises of the ICT sector in the context of organisational innovations amounted to 8.6% and 17.4% respectively, while in the context of marketing innovations, these values were respectively 8.3% and 15.9%. However, when analysing separately the production of ICT, and then ICT services, one can notice that enterprises from the ICT services industry dominate in terms of organisational and marketing innovations. For ICT production and ICT services in the context of organisational innovations, the ratios were 16.1% and 17.5% respectively, while in the context of marketing

innovations, these values were respectively 14.3% and 16.2%. When it comes to the first type of innovation, this prevalence is 1.4 percentage points, and in the case of the second type of innovation the advantage is slightly higher and amounts to 1.9 percentage points.

The comparison of the analysed types of innovations in ICT production enterprises and ICT services enterprises were presented in the figure below.

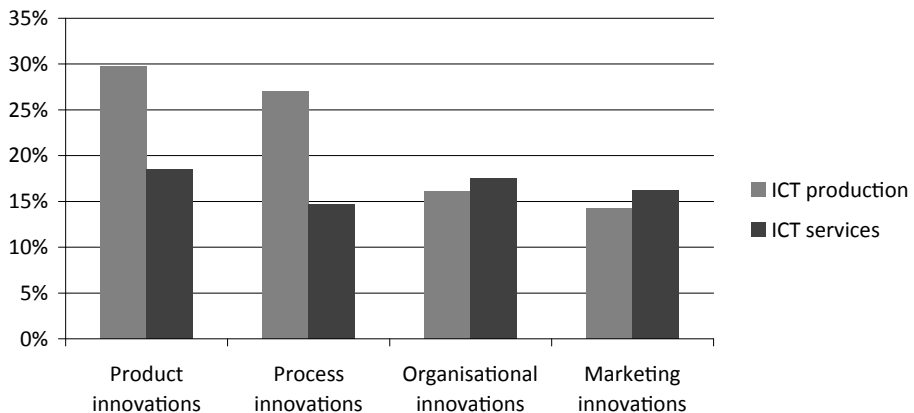


Figure 1. The comparison of all analysed types of innovations

Source: [GUS, 2017, p. 30-31].

Comparing the level of the organisational and marketing innovations with the product and process innovations, it can be noticed that the differences between enterprises from ICT production and enterprises from ICT services are not as significant as in the case of product or process innovations. In addition, product innovations have been most often introduced in both ICT production and ICT services.

Conclusions

Innovations, especially in the ICT sector are extremely important for socio-economic development. Innovative activity of enterprises from the ICT sector is much more intensive than in the case of Polish enterprises in general, which should be considered a beneficial phenomenon. The dominance of the ICT sector is noticeable in all analysed types of innovations.

Taking into consideration product and process innovations, it can be noticed that ICT production is much more better in this respect than ICT services. The

differences between ICT production and ICT services are not so significant if the subject of analysis are organisational and marketing innovations. In terms of these innovations, ICT services prevail a bit over ICT production and thus they are similar to hierarchy of relative frequencies in terms of revenues from sales of new or significantly improved products.

Literature

Ayres Robert U. 1987. „Technological protection and piracy”. *Economic Impact* 1/87.

Drucker Peter F. 1995. *Zarządzanie w czasach burzliwych. Nowe wyzwania – nowe horyzonty*. Warszawa: Akademia Ekonomiczna w Krakowie, Wyd. „Nowoczesność”.

Drucker Peter F. 2015. *Innovation and Entrepreneurship*. Abington and New York: Routledge.

Fagerberg Jan, Mowery David C., Nelson Richard R. (eds.). 2005. *The Oxford Handbook of Innovation*. New York: Oxford University Press Inc.

Forget Evelyn L. 2002. *The Social Economics of Jean-Baptiste Say. Markets and virtue*. London and New York: Routledge.

Gomułka Stanisław. 1998. *Teoria innowacji i wzrostu gospodarczego*. Warszawa: Centrum Analiz Społeczno-Ekonomicznych.

GUS. 2017. *Spółczeństwo informacyjne w Polsce. Wyniki badań statystycznych z lat 2013-2017*. Warszawa.

Jasiński Andrzej H. 1998. *Innowacje techniczne a działalność marketingowa*. Warszawa: Wydawnictwo Wyższej Szkoły Przedsiębiorczości im. L. Koźmińskiego.

King Nigel, Anderson Neil. 2002. *Managing Innovation and Change: A Critical Guide for Organizations*. London: Thomson.

Kline Stephen J. 1985. “Innovation is not a linear process”. *Research Management*. Vol. 28, No. 4 (July-August 1985), pp. 36-45.

Marciniak Stefan. 2000. *Innowacje i rozwój gospodarczy*. Warszawa: Kolegium Nauk Społecznych i Administracji Politechniki Warszawskiej.

Nowotny Helga (ed.). 2006. *Cultures of Technology and the Quest for Innovation*. New York: Berghahn Books.

OECD. 1992. *Technology and the Economy*. Paris.

Penc Józef. 1999. *Innowacje i zmiany w firmie: transformacja i sterowanie rozwojem przedsiębiorstwa*. Warszawa: Agencja Wydawnicza Placet.

Rogers Everett M. 2003. *Diffusion of Innovations*. New York: Free Press.

Schumpeter Joseph A. 2003. *Capitalism, Socialism and Democracy*. London and New York: Routledge.

Swann Peter. 2009. *The Economics of Innovation: An Introduction*. Cheltenham: Edward Elgar Publishing Limited.