Zeszyty Naukowe
Wyższej Szkoły Bankowej w Poznaniu
2020, t. 89, nr 2
DOI: 10.26349/zn.wsb.w.poznaniu.0089.01

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ICT as a benchmark for innovative enterprises

Abstract. *The main aim of the article is to define the role of information and communication technologies in innovative enterprises. After explaining the basic categories of ICT and highlighting the importance of ICT in innovative enterprises, the author presents results of a survey of industrial processing companies in Poland in the period 2015-2019. The analysis focuses on three important ICT factors: access to the Internet, having a company website and employing qualified workers in the company.*

Keywords: *technology, information and communication technologies, innovation*

1. Introduction

In the modern age, information and communication technologies are very important both from the perspective of the individual and the entire company. Many of us ask ourselves: Can a company function in the 21st century without ICT? The answer to this question is simple, because modern companies cannot operate without all the facilities that ICT gives them. Moreover, there is no need to isolate oneself from them; on the contrary, they should be implemented and used at a high level.

By conducting reflections and focusing on enterprises, it can be concluded that the owners, when deciding to implement ICT, make decisions which are the basis of a new form of organization. This gives companies the opportunity to enter a radically different stage of modernity. Constantly improved knowledge

and information significantly improve the competitive position of an enterprise on the market [Ziemba, Eisenbardt 2012: 165-166]. In the 21st century the introduction of information and communication technologies is a natural process often forced by the company's environment. Competition plays a crucial role in this respect, mainly the pressure and expectations of customers. Competitive advantage, customer satisfaction and improvement of company's efficiency are unquestionable advantages of ICT.

A very important aspect is that information and communication technologies are inextricably linked to innovation. They are determinants of an innovative enterprise. The implementation of ICT results in the adaptation of the company to operate in the era of widely developed modernity. The basic example is the access to the Internet, which is a technological innovation [Pawlik 2015: 562-565].

2. Information and communication technologies in enterprises

Information and Communication Technologies are very often found in the literature under the acronym ICT (Information and Communication Technologies). This issue is widely interpreted in various literature collections. However, both theoreticians and practitioners are constantly expanding this topic with new elements.

When considering the concept of ICT, the interpretation of the overarching element of technology is crucial. The basis of this word is the word from Greek, which means (techne), i.e. art, craft and (logos) the word, science. Normally, the term is defined as "science including a technical part concerning the methods of production or processing of raw materials, semi-finished products and articles" [*Słownik wyrazów obcych* 1980: 748]. Complementing the knowledge of interpretation there are many different interpretations in the collections of the literature on the subject. When considering the interpretation of this category, it should be noted that technology is a complex sequence of consecutive events in order to achieve planned effects, including specific products. Theorists conducting the considerations also pay attention to the resources of knowledge, which are extremely important for the correct, i.e. in accordance with the intended purpose of the course of certain activities or processes [Gwarda-Gruszczyńska 2013: 19-21].

Information and communication technologies concern the transmission of messages through all kinds of available technologies. They also aim to accumulate and process messages. All these activities are carried out in electronic form. ICT consists, among other things, of components such as:

– communication media include the Internet, bluetooth networks,

– devices such as computers,
– systems [Warzecha 2018: 115-116].

It should be noted that software is also a very important element, which is necessary for the proper functioning of the devices. Although information and communication technologies already cover such a diverse and large group of components, their scope is being extended from year to year [Warzecha 2018: 115-116].

It must be recognised that the use of ICT determines many benefits for businesses. The key benefits are presented in Figure 1.

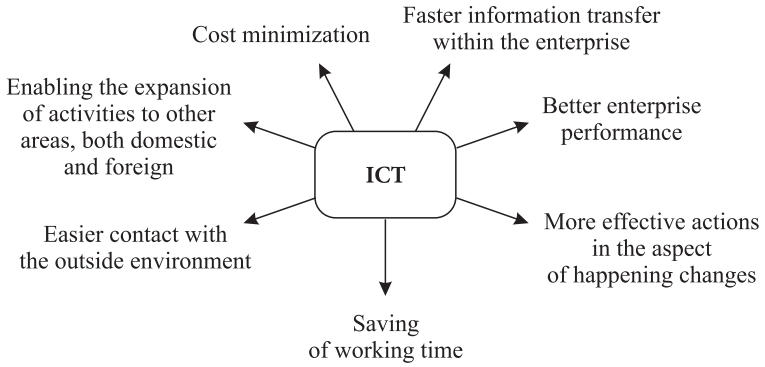


Fig. 1. Benefits of ICT use in enterprises

Source: own study based on: Tomaszewska 2011: 285.

The advantages of ICT use by companies include the possibility of achieving and improving their competitive position. Companies can achieve this in all areas of operation. From the company's perspective, the most important thing is to gain a certain number of satisfied customers [Caputa, Krawczyk-Sokołowska, Październik 2017: 14-25]. Therefore, companies having the superior element of ICT, which is access to the Internet, can easily and quickly expand their customer base. They do not have to limit themselves to local buyers only. An important issue in this respect is the website, which to a large extent enables this. Internet advertising also enhances the competitive advantage [Leoński 2014: 188-190].

3. ICT and innovation in enterprises

Innovations in enterprises can be simply defined as a completely new process created in a given organization, aimed in particular at improving various elements and structures of functioning. Implementation of innovations in enterprises requires from the owners a very large commitment both in financial and

Fig. 2. Types of innovation

Source: own elaboration based on: Janas 2019: 179.

organizational aspect. Investment in widely understood modernity is a priority element nowadays [Gorzelany-Dziadkowiec 2013: 46-55]. It is obvious that the level of innovativeness of Polish enterprises is still in the phase of continuous development. It depends on many different aspects. However, the functioning of a company developed in the area of information and communication technology has a significant impact on the implementation of innovation.

Due to the different categorisation of innovations, the scope of their division is very broad. In Figure 2, the selected division of types of innovations is presented.

ICT has a key impact on a company's level of innovation. They are an overriding element in eliminating restrictions that prevent innovation. The higher the availability rate of technology in an organisation, the easier and more efficient it is to innovate. What is more, entrepreneurs focus on the development of ICT in their companies because they gain a significant increase in the innovative potential of the company [Krawczyk-Sokołowska, Pierścieniak, Caputa 2019].

Attention should also be paid to the important aspect of sharing knowledge about innovation between businesses. ICT tools used by enterprises facilitate the flow of information. Companies can greatly increase their innovation potential. It can be stated that every innovation process is related to communication and information technologies [Wojnicka-Sycz 2013: 403-411].

Undoubtedly, the level of ICT use in enterprises indicates the degree of innovation of a given organisation. Particular attention should be paid to key factors such as Internet access, ICT qualified staff and having a website. These elements significantly increase the innovativeness of companies.

4. ICT analysis in enterprises from the industrial processing sector

Theoretical considerations allowed to define the area of information and communication technologies in enterprises and their significant impact on the name of an innovative enterprise.

The empirical research conducted concerns the use of information and communication technologies by companies belonging to the industrial processing department in the years 2015-2019. The analyses were based on data from the Central Statistical Office. The research covers key aspects of ICT:

– access to the global network,
– specialised ICT staff resources,
– the existence of the website, taking into account its purpose.

Table 1 presents data on Internet access of enterprises in Poland, specifying the companies in the analysed sector. This summary makes it possible to indicate the level of use of information and communication technologies in Polish enterprises and, consequently, the innovative progress of enterprises in the years 2015-2019.

Table 1. enterprises in Poland with access to the global network, specifying companies from the industrial processing sector [in %]

Years	Web access	
	Total enterprises in Poland	Enterprises in the industrial processing sector
2015	92.7	92.1
2016	93.7	94.1
2017	94.8	95.4
2018	95.6	95.9
2019	96.3	96.3

Source: own elaboration based on: GUS 2016, 2017, 2018, 2019.

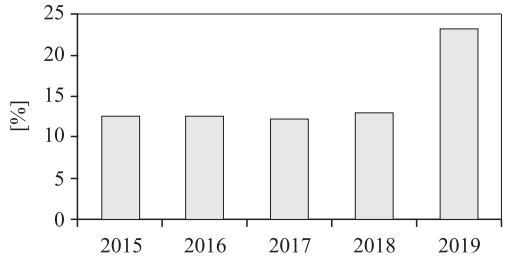
It should be noted that access to the global network is provided in a very large number of enterprises in Poland. This means that most companies use ICT to a significant extent. What is more, this number is increasing over the analysed years. In 2015, 92.7% of companies in Poland had access to the Internet. The analysis of Table 1 shows that year on year there was a progress by about 1%. In 2019, compared to 2015, there was an increase in Internet access in enterprises by 3.60%. This is a very positive phenomenon, as more and more entrepreneurs decide to implement information and communication technologies and thus to modernize their business.

When examining the industrial processing sector in 2015-2019, an upward trend was also noted. A significant 2% progress was recorded in 2016 in relation to 2015. In 2017 an increase of 1.30% in relation to the previous year was achieved. However, a significant slowdown in growth took place in 2018, as there was a 0.5% progress in relation to 2017. In 2019, the share of enterprises from the surveyed sector having access to the Internet increased slightly by 0.40%

as compared to 2018. Analysing the changes in value over the entire research period, it should be noted that in 2019 there was an increase in Internet access by 4.20% compared to 2015. The key in this statement is also the continuous increase in the share of enterprises in terms of Internet availability in Poland.

Qualified employees are of paramount importance in companies using ICT. Specialists in this field are needed to work properly and effectively on the basis of ICT. The analysis of changes in the number of employees in enterprises from the industrial processing sector in the years 2015-2019 is presented in Chart 1.

Chart 1. Enterprises in the industrial processing sector which employ people specialising in ICT over the research period 2015-2019

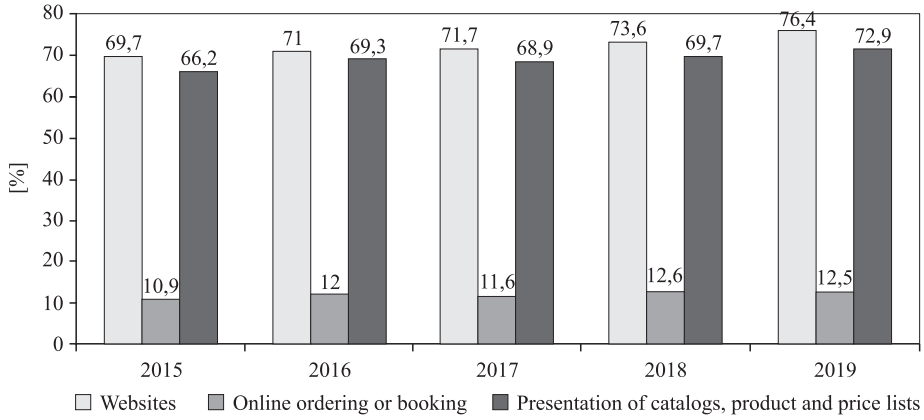


Source: own elaboration based on: GUS 2016, 2017, 2018, 2019.

The percentage of entities from the industrial processing sector which employ employees specialising in information and communication technology in the analysed research periods is characterised by fluctuations. Between 2015 and 2016, 12.5% of companies employed people with ICT skills. However, in 2017 there was an unexpected regression of 0.50% of companies. The recorded decline is a surprise in this comparison. The analysis of Table 1 indicated a continuous growth of enterprises from the surveyed sector in terms of Internet access. To a significant extent this is connected with the acquisition by companies, employees with the highest preferences in the field of ICT. In 2018, 12.70% of enterprises in the analyzed area were registered. A drastic increase took place in 2019, because 24.10% of enterprises in the surveyed sector had specialised employees in their staff. This was the highest progress in the years under consideration. Despite the recorded increase in 2019, few companies employ specialised staff in the field of ICT. This is not a beneficial phenomenon, as the use of technology in an enterprise is associated with the need to operate equipment, knowledge of complex processes and dependencies. It is therefore necessary to employ specialists.

It is also crucial to explore the area of businesses having their own website, as it is an important element in ICT-using businesses. By means of a website, companies in the 21st century are able to significantly increase the level of

Chart 2. Percentage of industrial processing companies that have a website with the target of having one between 2015 and 2019



Source: own elaboration based on: GUS 2016, 2017, 2018, 2019.

innovation. The analysis concerning websites and the purpose of their use is presented in Chart 2.

When analysing Chart 2, particular attention should be paid to the growing trend of industrial processing companies having their own websites. This trend is very satisfactory, and to a significant extent these activities enhance the innovative development of enterprises. Over the period covered by the study, it was noted that in 2015 69.70% of enterprises in the analysed sector used the website, and in 2019 it was as much as 76.40%. Thus, in 2019 there was a 6.70% progress in relation to 2015. Companies use their own websites to a small extent to order or book online. Significant fluctuations were noted, until 2016 there was an increase to 12%, but in 2017 there was a decrease of 0.40%. In 2018, 12.60% was recorded, and in 2019, a decrease in the ownership of websites for this purpose to 12.50%. From the data presented in Chart 2, it is clear that having own websites for the presentation of catalogues, products and price lists has proven to be dominant. However, this is not a continuous increase, as there are significant fluctuations between 2015 and 2019. In 2015, 66.20% of companies from this sector used the site for this purpose, and in 2016, there was a 3.10% progress. In 2017 the situation changed as a decrease to 68.90% was recorded. It should be noted that in 2018 and 2019 there was an increase. In 2019, 72.90% of industrial processing companies used their own websites to present catalogues, products and price lists.

The increasing number of companies that have a website is a positive development. It shows an increase in technological potential of the analyzed group of companies. First of all, it has a significant connection with innovations, as

websites are also a form of modernization of company processes. It turned out to be very interesting that companies from this sector do not have their own websites to order or book online. This function of the website is definitely not a key tool for companies. This is mainly due to the specificity of this sector.

5. Summary

The theoretical considerations on the essence of ICT in enterprises have allowed for the identification and definition of relevant categories. The advantages and benefits of using ICT in companies were identified. The wide range of benefits confirmed the importance of ICT in business operation. The conditions and types of innovation in a company have also been identified. In-depth consideration allowed to conclude that the degree of advancement of ICT in enterprises to a significant extent conditions and determines the level of its innovation.

The empirical analysis made it possible to assess the level of key ICT factors in Polish enterprises from the industrial processing sector.

The results of the research concerning Internet access of industrial processing companies and all enterprises in Poland in 2015-2019 are very optimistic. The analysis showed that every year more and more companies in Poland have access to the global Internet. The growth trend in this area is also characterized by enterprises from the surveyed sector. Access to the Internet is an overriding element of ICT, which enables the innovativeness of an enterprise and dynamic development, as well as an increase in its value and improvement of its competitive position in a specific sector.

The analysis covering the share of industrial processing companies employing specialised staff in the field of ICT proved that the results in this aspect are not satisfactory. Companies need to employ people with a broad knowledge of ICT. This is essential for proper use of ICT. Moreover, a high level of ICT usage results in the possibility to create and implement innovative changes.

The empirical analysis of the ownership of an industrial processing company's website showed an increase over the period under examination. The results of the analysis of the purpose of having a website by companies from the sector under investigation were a surprise. The presentation of catalogues, products and price lists proved to be dominant in this area. It should be noted that there was a small share of companies that had a website for ordering or booking online. It can be concluded that the websites allow for a significant degree of innovation.

In summary of the theoretical and empirical considerations, ICT is a key determinant of an innovative enterprise. Companies with highly developed in-

formation technology are able to create and implement innovations. Without access to ICT, companies significantly reduce and isolate themselves by remaining within the internal structure of companies, which means their lack of openness to the environment. It can be stated that the lack of access to ICT tools slows down the innovation process of enterprises and often means that they are unable to create and implement innovations.

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ICT jako wyznacznik innowacyjnego przedsiębiorstwa

Streszczenie. *Głównym celem artykułu jest określenie roli technologii informacyjno-komunikacyjnych w innowacyjnym przedsiębiorstwie. Przedstawiono interpretację podstawowych kategorii z obszaru ICT oraz wskazano specyfikę i znaczenie technologii informacyjno-komunikacyjnych w innowacyjnym przedsiębiorstwie. Przeprowadzono badania empiryczne przedsiębiorstw przetwórstwa przemysłowego w Polsce w latach 2015-2019. Analizę skupiono na trzech ważnych czynnikach ICT: dostęp do Internetu, posiadanie własnej strony internetowej oraz zatrudnienie w przedsiębiorstwie wykwalifikowanych pracowników.*

Słowa kluczowe: *technologia, technologie informacyjno-komunikacyjne, innowacje*