
The Role of Modern Technologies in Functioning of Contemporary Innovative Enterprises on the Example of Poland

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Abstract:

Purpose: The aim of the article is to present the role of modern technologies in using them by contemporary innovative enterprises in Poland from the NewConnect market.

Design/Methodology/Approach: Both quantitative and qualitative research methods were used. The data for analysis were obtained using the diagnostic survey method using the questionnaire technique. More specifically, the CATI method was used to obtain the data, which made it possible to find out the opinions of the respondents via a telephone conversation. The data was obtained in July - August 2020 in the form of a survey (quantitative research), as well as interviews and case studies of selected innovative enterprises at the turn of September and October 2021. In addition to the empirical method, the study also used theoretical research methods, such as the analytical-synthetic method, which was used to perform the critical analysis of the literature on the subject. Moreover, abstraction was used to select the necessary elements for the analysis. The data obtained from the survey questionnaire was compared with the recommendations in the field of using modern technologies by innovative enterprises in Poland. Generalization and inference were used to formulate conclusions.

Findings: The considerations contained in the article are the part of a broader research on the role of modern technologies in functioning innovative enterprises from the NewConnect market. It should be seen that the Internet era changed all the processes in contemporary business entities.

Practical Implications: Enterprises try to use many types of modern technologies to keep up with the with their internal and external stakeholders. Thanks to the use of digital technologies, companies start to achieve their goals by changing their business models and applying modern methods to meet stakeholder needs.

Originality/value: There are many articles about modern technologies but there is a lack of a publication fully devoted to the issue of using them in innovative enterprise, from the NewConnect market in Poland.

Keywords: Modern technologies, innovative enterprise, stakeholders, digital solutions, the NewConnect market.

JEL classification: M31, M21, L22.

Paper Type: Research study.

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1. Introduction

Teleinformation technologies are nowadays quite commonly used by enterprises operating both on a local, regional and global scale. However, a fundamental question arises here - is the implementation and development of these technologies in the information-decision-making and communication subsystem of the enterprise the result of real needs resulting from the necessity to adapt to changes in the environment, or maybe a specific "invention" of owners, managers or other groups of employees in the enterprise and the will to meet the global "fashion" for broadly understood computerization?

The answer to the above question is neither simple nor unequivocal. Of course, trends in the field of IT support for the activities of various classes of enterprises are important here - especially in the context of creating the image of the company as a modern, "moving with the times" entity, as well as innovative, reliable, open, dynamic, flexible and focused on rapid development. It is also worth emphasizing here the willingness to meet the expectations of potential customers or partners in terms of the level of "digitization/modernity" (Nowina Konopka, 2018, p. 34).

However, the above-mentioned motives do not seem to be crucial in the context of implementing and developing ICT in modern enterprises. This is due to the following reasons (Woźniak, Zaskórski, and Pawlak, 2018, p. 56):

- rational resource management - investing in the purchase and development of ICT, even if they are relatively simple solutions, it is a "pure" cost for the enterprise; therefore, maintaining technologies that only create the image of the company, but do not participate in generating the "real" added value for the company itself and its external stakeholders, can be perceived as a waste of resources and an indirect "weakening" of the company (opportunity cost appears);
- it seems necessary to analyze which technologies are important for stakeholders - if the company wants to use these technologies in creating its image and improving its operations in various aspects, the key action is to adjust the functionality of these technologies to the needs of various stakeholder groups in order to optimize the effectiveness their implementation and development; it is useful to clearly define which technologies are intended to serve specific stakeholders and what objectives they should meet.

2. Literature Review and Applied Research Methodology

2.1 The Characteristics of the Concepts of Digital Transformation and Digitization of Information

In enterprises, one of the basic contemporary trends is the modernization of processes through digital transformation. These processes are based on activities consisting in the implementation of systems using modern technologies and their use

in a manner that brings benefits. Thanks to the use of digital technologies, companies start to achieve their goals by changing their business models and applying modern methods to meet customer needs. As a result, companies are changing their workforce, information, data and process management. It can be said that digital transformation works multidimensionally.

There is also a need to distinguish between the concepts of digital transformation and digitization of information. Digitization leads to the use of technological products to support the use of processes taking place in the enterprise. These are processes involving sales, product manufacturing and marketing. The digital transformation, in turn, focuses on making the actions taken to be aggregated, and decisions about the future of the enterprise are based on up-to-date information obtained from various databases (Górnikiewicz, 2019).

As can be seen, digitization is only the first step in transforming projects among economic actors. The digital age is changing economic units. Thanks to it, companies can operate effectively and find themselves in the new reality that surrounds them, create a network of connections between clients, public administration units and enterprises. The position of customers on the market has also changed, all thanks to the electronic equipment and access to the Internet (Gonciarski, 2010, p. 21).

Referring to the impact of the transformation of the digital age on the management of an organization, it can be said that four trends have emerged that have arisen as a result of digital changes around the world. The former is credited with clustering around newly emerged markets.

There are constant transformations in industry and urban planning, which means that the most important part of the global economy migrates to Asian and southern countries. The second trend is the power with which technologies accelerate the phenomena arising on the market, their scope and the resulting consequences. The rapid development of technology, and hence the need for enterprises to adapt to the prevailing trends, causes that this has a negative impact on the functioning of companies and the goods they offer. At the moment, enterprises face challenges such as: time pressure, continuous updating of resources in the company and proper management of Big Data.

Another factor influencing the management of the organization is the greater number of elderly people. Currently, the society is aging, which has two consequences - firstly, the introduction of modern technological solutions in an enterprise may result in a lack of approval and passivity among older generations who have their own work pattern.

Secondly, it may be related to an increase in the costs of training courses aimed at preparing older generation employees for changes in the way the organization

operates. The last trend is the development force of international markets and the exchange of data, people and financial resources (Świczak, 2017, pp. 165-166).

Today, enterprises focus on network systems, which are considered an innovative approach to management. Organizations that use these types of systems tend to be accelerated and efficient sale. Continuous improvement of competences affects subsequent communication and adaptation of changes related to purchase and consumption (Dziwulski, 2016, p. 19).

Companies that started their operations in the period of the digital age formation often base their management model on less hierarchical systems. Decisions in such organizations are made relatively quickly, spontaneously. The people who make decisions pay more attention to the resulting effects and effects than to the process itself. These are so-called network organizations. Companies with longer experience operate in a process and their structure is definitely more formal (Biedrzycki, 2016).

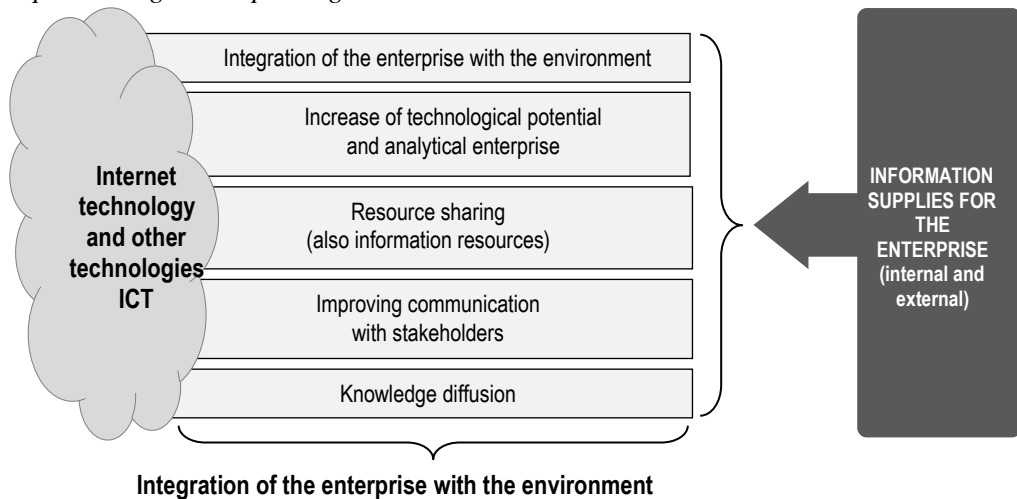
Particularly noteworthy in the process of digital transformation is the phenomenon of servicisation of consumption, i.e., increased consumption of services. This phenomenon is accompanied by the self-centeredness of consumers, which is possible thanks to the growing equipping of households with the latest technical and technological equipment, guaranteeing numerous, fast and cheap methods of transmitting information, thanks to which professional and non-professional activities can be transferred to the privacy of the home.

This leads to the growing consumption of intangible assets, such as: knowledge, information, actions to improve the well-being and health of household members, and thus the role of services in the sphere of consumption is growing (Włodarczyk, 2013).

Internet technology is gaining in importance nowadays, as it enables enterprises with a "limited" portfolio of IT solutions used to implement processes on a global scale. It is the basis for creating, among others virtual structures, linking various contractors with a certain level of "technological advancement" (here in the meaning of the IT area) with a network of information connections.

This is of key importance for the formation and development of the so-called sharing economy, where the company's potential is not mainly determined by access to specific resources (not only material and financial, but also information), but rather innovation and the ability to communicate and process resources (Adamska-Chudzińska, 2014). Moreover, the mechanisms occurring in the conditions of the aforementioned sharing economy are a specific example of glocalisation processes - both at the level of business processes (i.e., basic) and information and decision-making processes, which may translate into the use of specific ICT technologies by the enterprise (Figure 1).

Figure 1. Integration of the enterprise with the environment - the perspective of implementing and improving ICT



Source: Own work based on Woźniak, Zaskórski, Pawlak, 2018.

2.2 Types and Kinds of New Technologies Used in Enterprises

Speaking of the digital age, one should mention a platform called SMAC. It is the so-called third information and communication technology (ICT) platform that has evolved during the development of information and communication technologies (Chaney, 2012).

Nowadays, one of the most intense challenges facing the society and economy is the ubiquitous digitization of everything that surrounds us. This creates the potential to formulate new innovative business models. Despite the many positive aspects of this trend, there are some threats that relate to the effect that may arise from production automation and safety understood in a multidimensional scope.

The decisive elements that activate changes in the digital economy include (Pieriegud, 2016, p. 11):

- hyperconnectivity - diffuse connectivity;
- Cloud computing - processing of all data in a computing cloud;
- Big Data Analytics (BDA) - analyzing large and diverse databases;
- automation and robotization;
- multi-channel and omni-channel - strategies supporting customer acquisition and service;
- Internet of the things (IoT);
- SMAC technology;
- artificial intelligence (AI).

The SMAC system enables the preparation and implementation of innovative business models based on assumptions such as social, mobile, analytics, and cloud. Through Social we understand any social media that enables fast communication. Information flow is disrupted and platforms are becoming one of the most effective ways of communicating between people.

This also applies to companies that will use new channels of communication with customers in order to be up-to-date and to act comprehensively in case of problems. Social networks affect the speed and quality of problem solving. Another pillar - mobile - includes all electronic devices with everyday functions (mobile phones, tablets, laptops). They support the decision-making and purchasing process of consumers through the use of applications and websites.

Entrepreneurs face the challenge of creating technological opportunities for consumers, and thus also the compulsion to modernize the network digital marketing (Margraf, 2011; Wereda, 2018). The next pillar are the tools enabling data analysis - analytics. Entrepreneurs, using the data previously analyzed by highly developed support systems, have the opportunity to interpret them and select appropriate actions. These activities are aimed at taking care of the customer and improving the marketing activities, the process of designing and creating the product.

The last pillar is the so-called cloud, i.e., cloud computing. It provides the necessary support elements helping in the concentration of information and effective management of the organization. The tools used in this cloud make it possible to reduce expenditure on information and communication technologies (Adamczewski, 2017, p. 12).

The four components of the SMAC technology described above are closely related and complement each other. This means that their simultaneous use makes it possible to obtain synergy. So far, companies have used the four SMAC components as separate pillars, which have generally provided little benefit. Thanks to the ICT platform that linked these pillars, the prospect of creating a positive image of the company among customers and innovative services that bring benefits or improvement of activities undertaken in the organization has opened up (Adamczewski, 2017, p. 13).

Artificial Intelligence (AI) presents many opportunities, but on the other hand, raises some concerns among enterprises. AI has the attributes of intelligence that allow it to carry out tasks, but is considered an artificial product where humans use their own intelligence. Currently, Artificial Intelligence has been used for (Flasiński, 2011, p. 241):

- perception of patterns, images;
- collecting, learning and adequately responding to the generated impulses;
- unraveling the existing difficulties;

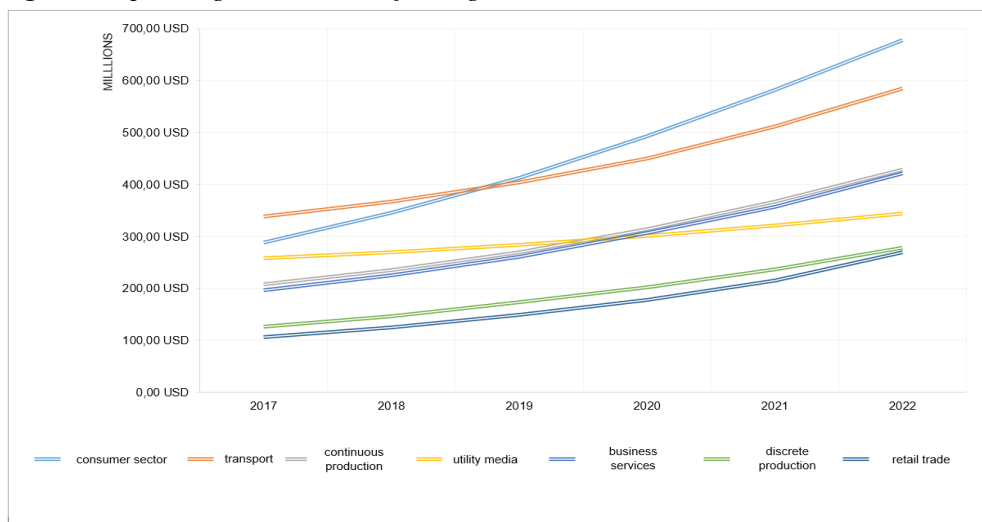
- deduction;
- deciding, determining appropriate actions;
- making plans;
- modifying the language people use to communicate (natural);
- disposition to translocate and influence.

The development of artificial intelligence and the widespread availability of digital technologies is supported by Big Data technology. This does not only apply to huge databases, but also includes notifications, system improvements (updates), graphics posted on social networking sites and websites, and enables the collection of data in the form of GPS sources sent via smartphones (Bryniolfsson and McAfee, 2014, p. 45).

On the other hand, the Internet of Things (IoT), which at the moment is at the stage of development and is only beginning to gain significance among enterprises, perhaps it will soon replace the current "Internet of people". It is also worth noting that IoT is a consciously adopted project because it acts as an intermediary between devices. It enables them to contact each other, verify the collected information and initiate activities aimed at integrating these devices by taking appropriate actions. The Internet of Things consists mainly of (Miller, 2016, pp. 34-62):

- devices with receivers which generate or simultaneously capture information;
- networks that connect electronic devices with each other using technologies, in particular wireless;
- software which task is to collect, modify and verify data in order to use them later to achieve the intended goals and tasks.

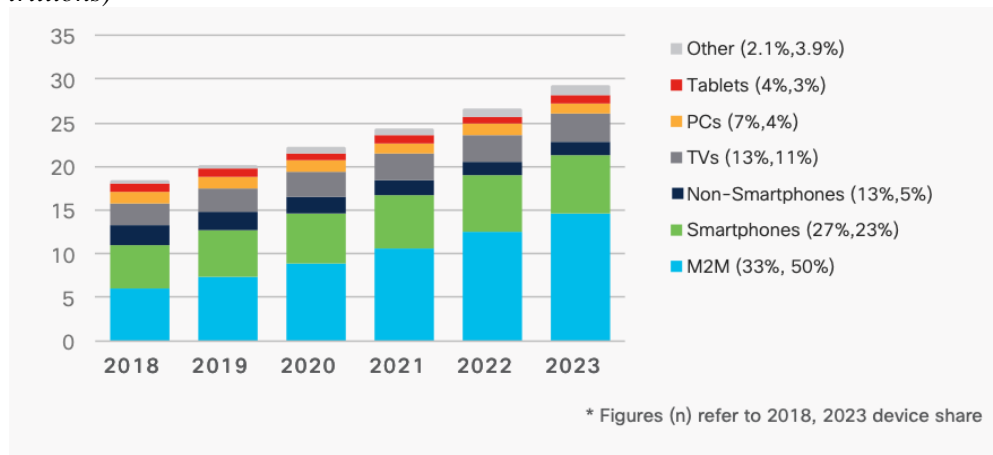
Figure 2. Spending on "Internet of Things" in individual industries in the world



Source: Own study based on the Report "IoT and the Polish Economy", 2019, p. 18.

Figure 2 shows expenditure on IoT in individual industries existing on the market. The consumer sector currently invests the most in the so-called "Internet of Things" and has surpassed the transport (logistics) sector. The retail and discrete manufacturing sector is not looking to invest in extending IoT applications, perhaps due to the lowly optimistic outlook for converting these investments into means of payment (Reprt "IoT and the Polish Economy, 2019). In addition to the noticeable increase in spending on IoT in most industries, there is also a visible increase in devices in the world.

Figure 3. Increase in the number of devices and connections in the world (in trillions)



Source: Cisco Annual Report, 2020.

According to a report prepared by Cisco, the increase in the number of devices in the world continues to increase and every year new devices are introduced to the market in various forms with developed usability and advanced intelligence. The largest increase is noted among M2M (machine to machine) devices. These include all intelligent meters, video surveillance, health care monitoring, transport, and shipment monitoring. It is estimated that in 2023 M2M connections will constitute half of all devices and connections in use. Smartphones are in second place, with an increase of 7% per annum.

Televisions are the third device that is growing in strength. In recent years, their rapid development can be noticed, taking into account the possibilities of Internet connections, set-top boxes, digital media adapters, and game consoles. The average annual increase is below 6%, which in 2023 could bring 3.2 billion TV sets. The decline is occurring among PCs, but the rate remains greater than for tablets. It is calculated that by 2023 the share of consumers in the total number of devices, including fixed and mobile devices, will amount to 74%, and the remaining 26% will be allocated to companies - Figure 23 (Cisco Annual Report, 2020).

2.3 Characteristics of Respondents

The subjective scope of the research includes innovative companies operating on the *NewConnect* market in Poland. The study included 100 enterprises (27% of entities from the population, and the population was made up of 373 companies from Poland). Moreover, most of the surveyed enterprises conduct their basic activities in the trade (16 entities) and financial services (15 entities) sectors.

Next, there are, building and construction, new technologies and e-commerce (8 entities each) as well as media and computer science (7 entities each). Therefore, in the study, systematic random selection was used (taking into account the criterion of the leading profile of activity indicated for the purposes of records on the *NewConnect* market) in layers (the layers correspond to the size of the enterprise).

The respondents were managers or managers (of the highest or middle level) responsible for the area of relations with the environment or innovation, or operational employees (of the lowest level) employed in companies listed on the *NewConnect* market (1 respondent from each company). The empirical study was conducted in the period of July - August 2020 and covered the territory of the entire country (16 provinces in Poland).

Most of the surveyed enterprises have their headquarters in the following voivodeships: Mazowieckie and Łódzkie (16 entities each), Śląskie (14 entities) and Wielkopolskie (12 entities). On the other hand, the survey was supported by 10 in-depth interviews among the previously surveyed respondents from innovative enterprises at the turn of September and October 2021 (Wereda, 2022).

3. Results

The obligation to look for new sources of financing is often caused by operational problems, i.e., resulting from the fact that the sales management system is often constructed only traditionally, without building relationships between the company and employees and other stakeholders, for example customers, suppliers, investors, etc.

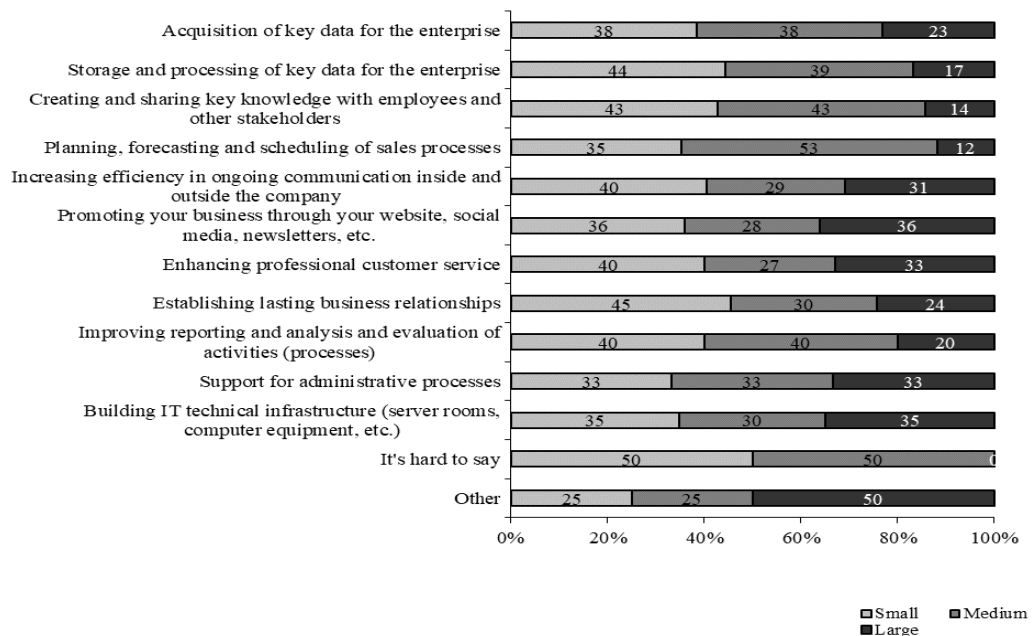
Declarations resulting from organizational documents and the principles of the sales process do not translate into the actual functioning of the entire enterprise. It is necessary to build awareness of the purposefulness of the technologically-developed sales process in the organization and to involve all employees in this process, from managerial staff to employees of all departments, even without direct contact with the customer.

The author was bearing in mind that ICT and the contemporary sales affect the correct and consistent process of company management, because they are key elements of the effective functioning of any organization. By creating an appropriate

sales process supported by ICT, the enterprise should not only shape the sales management process through appropriate regulations and procedures specifying, inter alia, desired attitudes in this regard, planning, appropriate organizational examples, incentive systems not only of a financial nature, as well as methods of communication and training of employees in terms of their obligations related to sales, reporting and controlling results, but also risk reduction or building trust in long-term relationships.

Therefore, it is possible to indicate which areas of operation in the surveyed companies are affected by the implemented sales process supported by ICT (Figure 4).

Figure 4. Areas of activity affected by the use of ICT in the contemporary companies listed on the NewConnect market (N = 100) in (%) in July-August 2020



Source: Own work.

For many companies, the impact of ICT on the functioning of the unit is very noticeable in many areas of operation, i.e., establishing lasting business relationships, increasing professional customer service, promoting business through the website, social media, newsletters, etc., increasing efficiency in ongoing communication inside and outside the company, planning, forecasting and scheduling sales processes, creating and sharing key knowledge with employees and other stakeholders, storing and processing key data for the company, acquiring key data for the company, building IT technical infrastructure (server rooms, computer equipment, as well as increasing the role of Bid Data or Artificial Intelligence, etc.),

support for administrative processes or improvement of reporting, analysis and evaluation of activities (processes) and others, such as: negotiations with the contractor in order to agree terms sales, mutual contacts with recipients, customers and other stakeholders, and joint consultations.

4. Conclusions

It can therefore be admitted that management processes and the broadly understood conditions for their implementation implemented in the conditions of the global economy - determined both by the potential and limitations of the enterprise and its external stakeholders - should be taken into account when choosing appropriate ICT technologies.

Information and communication technologies in the conditions of the development of the sharing economy are applicable in various industries and sectors. Particularly noteworthy is the developing sector of services (especially specialized professional services) - not only in the realities of the Polish economy, but also in the global perspective.

The cooperation of an enterprise, which in its operational activity comes down to the exchange of current information resources, with the use of social networking technologies, may nowadays be of particular importance in creating the value of the product (product or service) offered to the client in the case of enterprises providing, inter alia, professional services, semiconductor manufacturing and retail banking. Technologies help enterprises in obtaining information and data, as well as in customer service or building loyalty relationships with various stakeholders.

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