CONTEMPORARY TRENDS AND CHALLENGES OF ENTREPRENEURSHIP, SECURITY AND LOGISTICS

EDUCATION AND R&D AS A POLISH EXPORT COMMODITY

Editor
Tomasz Wołowiec

Introduction

Modern science is increasingly based on interdisciplinarity and the multifaceted approach of researchers to the phenomena and processes presented. The demand for interdisciplinarity is a response to the challenges arising with the development of science: first, as a response to the progressive professionalization, specialization and institutionalization in the field of scientific research; second, as a response to the challenges facing science as our reality in its nature and structure is becoming more complex and thus more difficult to explore scientifically.

Interdisciplinarity means focusing attention on issues that are located at the intersection of various disciplines. The monograph presented here is the result of a collaboration of scientists representing various scientific disciplines from administration and policy sciences to psychology, economic sciences, health sciences and information technology. The submitted articles show the process of freeing oneself from a narrow approach to complex issues, established within a single field of knowledge, and the many research limitations that result from this. The chapters presented are the result of scientific cooperation both at the interface of the above-mentioned disciplines and international cooperation between partner Universities, as well as the wider business (business practice).

The chapters present different research approaches. Induction was used as the main research method. It involves drawing general conclusions or establishing regularities on the basis of analysis of empirically established phenomena and processes. It is a type of inference based on details about the general properties of a phenomenon or object. The use of this method requires the assumption that only facts can form the basis of scientific inference. These facts are real-life situations (e.g., social, legal or organizational). Inductive methods include various types of analysis, expert opinion, statistical data and scientific documents used in social research. In addition, the articles make use of two general research methods, i.e. analytical and synthetic methods, which are characterized by a particular approach to the study of reality. Analytical treats reality as a collection of individual, specific features and events. Following this research method involves breaking down the object of study into parts and studying each part separately or detecting the components of that object. A negative feature of the analytical method is the overexposure of details, sometimes resulting in losing sight of the whole object of study. This hinders full and objective cognition of reality, which is admittedly a collection of independent partial elements, but at the same time a set of parts closely related to each other into a limited whole. The synthetic method treats reality as a collection of features, its implementation consists in searching for common features of various phenomena and events, and then binding them into a unified whole. Thus, the synthetic method examines and determines the totality of the object of study. Using a comprehensive (hybrid) research approach, the so-called

triangulation of data sources was also applied, i.e. comparing information, methods and tools used in different scientific disciplines to solve research problems from the perspective of many different practical and theoretical research concepts.

Interdisciplinarity as a demand to study reality beyond the boundaries of scientific disciplines is an important added value, since the analysis of the studied reality from the perspective of different scientific branches broadens, deepens, modifies and clarifies the research results, which is extremely developmental and beneficial for science. Interdisciplinarity is both transcending a particular discipline, the one represented by the researcher, and considering a particular topic from different perspectives (e.g., administrative and political sciences, management or computer science and telecommunications). Among other things, the chapters employ the following research methods: comparative analysis, functional analysis, which was used to capture the cause-effect relationships of the phenomena and processes under study, research methods from a dynamic perspective (important both for a holistic view of the specifics of a given problem, as well as for grading the applicability of the results obtained), and methods of quantitative and qualitative analysis.

Reflections on interdisciplinary research allow us to conclude that it requires increasingly complex methods for conducting empirical research. This necessity is due, among other things, to the dynamics of the surrounding reality, the processes of unification of scientific disciplines, as well as the increasing digitization and automation of social processes, which implies a modern understanding and explanation of constantly changing social and economic phenomena.

The submitted monograph is the result of cooperation of the Lublin WSEI Academy with universities and scientists from other countries as part of the internationalization process of the University in three areas: teaching, projects and scientific cooperation. The University's Development Strategy and the correlated strategy for the development of the Institute of Public Administration and Business and individual scientific disciplines assume the involvement of staff in national and international scientific activities and research programs, establishing cooperation with foreign scientific centers (participation in international projects, joint research), as well as establishing cooperation with leading scientific publishers as an editor, reviewer, author (monographs, journals and special issues of journals).

Dr. Tomasz Wołowiec, prof. of the WSEI University in Lublin

*Tomasz Wołowiec**
*Sylwia Skrzypek-Ahmed***
*Paul Vincent****
*Haruna Muhammad Awwal*****

RESEARCH ON STIMULATING ENTREPRENEURSHIP BY LGU'S AND THEIR ANALYSIS

Badania nad stymulowaniem przedsiębiorczości w gminach i ich analiza

*PhD., DsC. Assoc. Prof., WSEI University in Lublin, ORCID: 0000-0002-7688-4231
**PhD., Assoc. Prof., WSEI University in Lublin, ORCID: 0000-0002-1211-0683
***PhD., Assoc. Prof., Nasarawa State University in Keffi, ORCID: 0009000624618886
****PhD., Assoc. Prof., Nasarawa State University in Keffi, ORCID: 0000000181325568

Streszczenie

Celem badań jest ocena czynników wpływających na rozwój przedsiębiorczości, ze szczególnym uwzględnieniem polityki podatkowej na przykładzie wybranych gmin województwa małopolskiego. Badania oparto na wybranych danych statystycznych i innych publicznie dostępnych źródłach informacji, jak i na informacjach uzyskanych w trakcie wywiadów i ankiet, których respondentami byli zarządzający gminami, jak i podmioty gospodarcze działające w badanych gminach. Badanie prowadzono za pomocą wielu metod ilościowych i jakościowych. W warstwie ilościowej, na podstawie różnorodnych źródeł. Okres badań obejmuje lata 2015-2021.

Słowa kluczowe: *przedsiębiorczość, konkurencyjność, rozwój lokalny, dane statystyczne, metody ilościowe i jakościowe, efektywność ekonomiczna, zarządzanie rozwojem lokalnym*

Summary

The aim of the research is to grade factors influencing the development of entrepreneurship, with particular emphasis on tax policy on the example of selected communes of the Lesser Poland Voivodeship. The research was based on selected statistical data and other publicly available sources of information, as well as on information obtained during interviews and questionnaires, whose respondents were municipal managers and business entities operating in the studied municipalities. The research was conducted using a number of quantitative and qualitative methods.

In the quantitative layer, it was based on a variety of sources. The research period covers the years 2015-2021.

Key words: entrepreneurship, competitiveness, local development, statistical data, quantitative and qualitative methods, economic efficiency, local development management

Introduction

The spatial concentration of enterprises affects the investment climate of the region by shaping its individual components. Firstly, thanks to the activities of companies, labor resources are developed, and human capital is strengthened as a result of local employee mobility. Secondly, the greater the entrepreneurship, the more receptive the local market. This relation is particularly visible in the case of industries focused on servicing enterprises and in the case of large and medium-sized cities in Małopolska and the Lubelskie Voivodeship. Entrepreneurship shapes the number and scope of activities of business environment institutions included in the economic infrastructure. Locally high entrepreneurship attracts the business service sector, which strengthens entrepreneurship and allows you to attract external investors.

The growth of entrepreneurship in Małopolska is characterized by a pace similar to that observed at the national level. A positive feature is the reduction of intra-regional differences in the level of entrepreneurship in 2015-2022. Apart from the diversification of entrepreneurship in the city-village system (especially visible in the field of medium and large companies), there is a clear contrast between the western and eastern Małopolska. At the same time, the processes of economic suburbanization are taking place, especially visible in the suburban area of the city of Krakow. Moreover, a large number of private companies related to the number of inhabitants occurs in tourist communes[1].

The activity of foreign capital is one of the most important factors of regional and local development in Poland. Companies with foreign capital include a source of new jobs, technologies and modern management methods. The presence of foreign companies locating their investments (greenfield) in specific municipalities can be considered in two perspectives: the factor facilitating the acquisition of new investors and the investment attractiveness index. Almost all municipalities where medium and large foreign capital expenditures took place focus on three areas:

a. Cracov Metropolitan Area (Cracov metropolis – CMA), in particular the central city and the suburban area. It is an area with by far the highest concentration of new foreign investments. 2/3 of the total expenditure in the voivodship is accounted for by four communes: Kraków, Niepołomice, Skawina and Wielka Wieś;
b. communes located in the corridor of the main communication axis of the region: A4 motorway and national number 4. Most investments (excluding the areas adjacent to this axis in CMA) were attracted by Brzesko, Chrzanów and Tarnów;

[1] R. Guzik, K. Gwosdź, J. Działka, Klimat inwestycyjny w województwie małopolskim, Małopolskie Obserwatorium Gospodarki, Kraków 2013.

c. three industrialized counties in western Małopolska: Oświęcim, Chrzanów and Olkusz. Most of the capital went to poviat cities, significant outlays were also attracted by smaller cities: Chełmek, Bukowno, Wolbrom;
d. apart from the above-mentioned areas, only Nowy Sącz and Gorlice were of greater interest to investors.

The scale of local success in attracting foreign investors is reflected in the size of the capital involved in relation to the number of inhabitants. The leaders in Małopolska are two communes of the Krakow poviat: Niepołomice (USD 21,000 per capita), where this value is five times higher than the voivodship average, and Wielka Wieś (USD 18,000 per capita). While Niepołomice is a recognized leader in attracting external investors, pursuing an effective pro-investment policy since the beginning of the 1990s, the success of Wielka Wieś (and mainly the village of Modlniczki located on its territory with excellent spatial accessibility) is mainly the result of the last 5 years. Another clear difference concerns the type of investors – Niepołomice attracted mainly industrial activities, and Wielka Wieś – logistics and commercial activities.

The existing spatial layout of greenfield investments indicates a strong differentiation of investment attractiveness factors in the Małopolskie Voivodeship from the point of view of external investors.

Trade investments are eminently market oriented. Nearly three-quarters of the financial outlays for new facilities were incurred in Kraków, followed by Tarnów and Nowy Sącz. In total, greenfield expenditures of USD 1 million and more can be found in 35 municipalities of the voivodeship. The high concentration in Krakow results both from the largest sales market in the voivodship (the number of customers and their wealth), consumer habits favorable from the point of view of commercial networks, and finally from the high capital intensity of large-scale facilities implemented in the voivodeship capital. However, the penetration of the voivodeship space by trade is of a hierarchical diffusion character and currently covers more and more locations with relatively low potential – even several thousand inhabitants.

Services are a sector where inputs are even more concentrated than trade. There are few places that attract more interest from investors in this sector – greenfield investments worth USD 1 million have been identified only in 23 municipalities. More than three-quarters of investments took place in Kraków, over 10% in other communes located in CMA (mainly in the areas adjacent to Kraków – Wielka Wieś, Zabierzów, Niepołomice, Wieliczka, Skawina), and the rest mainly in Nowy Sącz, Tarnów and Oświęcim. Investments in knowledge-intensive services are concentrated only in Krakow and some municipalities adjacent to it, while other municipalities attract services aimed at the local market - mainly commercial real estate for rent, banking and insurance establishments.

The distribution of entities providing business services in the Małopolskie Voivodeship shows several regularities. First of all, you can see the domination of the three largest cities in virtually every field of this type of activity. The high level of equipment with business services is also characteristic of the municipalities

neighboring Krakow from the north and west, and the municipalities of the western subregion. Also some smaller poviat towns (Myślenice) and those that are places of concentration of economic activities (Niepołomice) are well equipped for this type of activity. The lowest concentration of services for enterprises occurs in the rural areas of the voivodeship, especially in its eastern and southern parts. An important characteristic of the distribution of this type of activity is also their greater number in the part of Małopolska adjacent to the Śląskie Voivodeship. This applies especially to companies from the financial and IT industries.

Local business development factors

The most important factors determining the distribution of business services in Małopolska are: the size of a given settlement unit (measured by the number of inhabitants) and the level of development of local entrepreneurship. The total number of enterprises operating in a given place affects the level of development of the business services industry – it may cause the underdevelopment of the sector (e.g. cities dominated by single large employers, e.g. Libiąż), or its concentration (e.g. Nowy Targ, Niepołomice, Myślenice) in compared with the size of the center measured by the number of its inhabitants.

Business services are an important element of regional investment attractiveness. Their presence influences both the possibilities of attracting external investors as well as the development of local entrepreneurship. The conducted analysis shows that Małopolska cities are well equipped with this type of activity, with particular emphasis on the largest centers: Kraków, Tarnów and Nowy Sącz. Peripheral communes of the voivodeship, especially those located in its eastern and southern parts, are often areas of poor development of business services. Most often it is caused by the agricultural specialization of local economies, the lack of strong economic entities and little local entrepreneurship.

The factor that weakens the investment attractiveness of the Małopolskie Voivodeship as compared to other regions of the country are small resources of investment areas, especially those over 50 ha, which can accommodate large industrial investments. The largest area offered is the area of 142 ha in the village of Brodła in the Alwernia commune. The commune of Niepołomice also offers, currently used for agriculture, land with an area of 116 ha, for which the procedure of changing the spatial development plan is underway, intended for "modern industry, high technologies, laboratories, services, warehouses". The city of Chrzanów promotes the offer of an investment area with an area of 102 ha for production and warehouse activities, owned by the municipal commune of Chrzanów and private individuals, and located near the Chrzanów II motorway junction. Tarnów has, in the south-eastern part of the city, a vast, undeveloped area of 100 ha of the former farm of the Complex of Economic and Horticultural Schools. Among the areas away from the main communication axis of the region, Wolbrom, a town in the Olkusz poviat with a large

industrial tradition, has the most extensive offer in the northern part of the voivodeship. The relatively high activity of the traditionally agricultural communes of the Proszowice and Dąbrowski poviats is visible. However, in the southern part of the region, few offers concern mainly areas intended for sports and recreation services, hotel and catering services and spa treatment.

In the subregional system, the communes of the Cracov Metropolitan Area and Western Małopolska are the most active. On the other hand, the largest number of offers with a large area is available in the Tarnów subregion - plots with a total area of over 100 ha are offered in Tarnów, the rural commune of Bochnia, in Brzesko and in the communes of Lisia Góra and Szczurowa. Numerous offers with a total area of over 950 ha are at the disposal of the communes of Western Małopolska, especially Chrzanów, Oświęcim, Alwernia and Trzebinia. In the Cracov Metropolitan Area, Niepołomice has the largest resources of investment areas, where nearly 250 ha of plots of land for investment have been identified. The next five communes of the Cracov, Wieliczka and Proszowice Poviats as well as Cracov offer areas with a total area of 50 to 70 ha. The other two sub-regions offer a much smaller number of investment areas. In the nowosądecki subregion, only three municipalities have greater resources: in Piwniczna-Zdrój, Stary Sącz and Krynica-Zdrój, where the aforementioned areas intended for services (tourism or spa) are promoted. In the Podhale subregion, only Nowy Targ recorded greater resources of investment areas.

Various types of more or less detailed and comprehensive pro-investment solutions were proposed for implementation in the strategic documents of 155 communes of the Małopolskie Voivodeship (91,17% of the examined communes), including 12 urban communes, 45 urban-rural communes and 98 rural communes. At the same time, it should be noted that in the case of 56 surveyed local government units, references to pro-investment policy were at the level of the vision and / or development mission, which may indicate the great importance that these municipalities attach to the process of attracting investors. At the level of the vision and / or mission of development, the most frequent attention was paid to the openness of local authorities to external investors, as well as the need to increase investment attractiveness and build a favorable climate for investors.

Pro-investment activities under all the previously mentioned thematic categories were envisaged for implementation in the documents of 19 local government units. This group included 2 urban municipalities (Nowy Sącz and Nowy Targ), 8 urban-rural municipalities (Alwernia, Andrychów, Chelmek, Libiąż, Myślenice, Piwniczna-Zdrój, Proszowice, Szczawnica), as well as 9 rural municipalities (Czarny Dunajec, Dębno, Kozłów, Nowy Targ, Olesno, Pcim, Szczurowa, Wielka Wieś and Zabierzów).

The assessment of strategic documents of the considered LGU's is correlated with the type (kind) of communes, their size (measured by the number of inhabitants), as well as with their location within the Małopolskie Voivodeship. The highest average scores were given to municipalities (6,00). In the case of urban-rural communes, its average value was 5,83 points. The lowest score was given to strategic documents

of rural LGU's (3,89). At the same time, the highest average score in terms of pro-investment activities was received by communes with a population between 20,000 and 50,000 people (6,79). It is also worth noting that this group included 6 out of 13 local government units which received a score of 10 points. Both in the case of municipalities with a population of 50 to 100 thousand. residents (Nowy Sącz, Olkusz, Wieliczka), as well as over 100,000 inhabitants (Cracov, Tarnów), the average score for strategic documents was 6,00. On the other hand, for communes with a population between 10 and 20 thousand. people, was 4,55. The lowest average score was given to strategic documents of communes with less than 10,000 inhabitants (3,71). This group included only one commune, which obtained a score of 10 points (Szczawnica). The above regularities should be related to the fact that large and medium-sized urban and urban-rural communes are generally characterized by a higher organizational and financial potential compared to small rural LGU's and thus are characterized by relatively greater possibilities of conducting a comprehensive pro-investment policy. The average score for strategic documents was 6,00[2].

It is worth noting that 123 municipalities (72,8% of the total number of respondents) proposed the implementation of detailed projects – the most frequently indicated tasks are: designating investment areas in planning documents (83 municipalities – 49,1% of respondents) and developing land intended for economic activity in the network and technical infrastructure equipment (79 communes – 46,7% of the respondents). The simultaneous implementation of the above-mentioned projects was proposed in the strategic documents of 54 communes. These phenomena should be assessed positively, as they mean that local authorities are more aware that in the process of effectively attracting external capital, the main role is played by having an attractive investment offer separate and equipped areas for business activity.

In the case of 47 Małopolska municipalities (27,8% of the total surveyed), the preparation of the investment offer is to focus on the creation of new or development of already existing dense complexes of investment areas (including economic activity zones, industrial zones, subzones of special economic zones 10). Such solutions were proposed for implementation in the strategic documents of 6 urban municipalities (Bukowno, Bochnia, Nowy Sącz, Nowy Targ, Oświęcim, Tarnów), 22 urban-rural municipalities (including Brzesko, Chełmek, Chrzanów, Dobczyce, Kęty, Myślenice, Niepołomice, Skawina, Trzebinia, Wieliczka, Wolbrom, Zator), and 19 rural municipalities.

Among the initiatives aimed at attracting external capital, an important place is the dissemination of the offer and investment values. Undertakings in the field of economic promotion are planned for implementation in 111 communes of the Małopolskie voivodship (65,7% of the respondents), but only half (56 communes – LGU's) indicated in the strategic documents at least one form of popularizing the investment offer. The most frequently chosen method of disseminating economic values is promotion through the official website of the office (34 communes – 20,1% of all respondents).

[2] R. Guzik, K. Gwosdź, J. Działka, Klimat inwestycyjny… op. cit.

29 communes (17,2% of all respondents) adopted in their strategic documents the development and distribution of promotional materials (eg folders and guides) as a form of disseminating economic values. Participation in economic events (fairs, conferences, presentations of the investment offer) was planned in 29 LGU's, and 25 communes (14,8% of respondents) decided to promote economic activities in the media (mainly in the press). Popularization of the investment offer through media advertising and participation in economic events was most often chosen by municipal and urban-rural communes (including Andrychów, Bochnia, Chełmek, Gorlice, Kęty, Myślenice, Nowy Targ, Tarnów, Wojnicz, Zator), which should be associated with high costs of this type of promotion.

Strategic documents of 112 communes (66,3% of the respondents) contain provisions concerning preferred economic activities. In 81 communes (47,9% of the respondents), investments in the field of tourism and recreation were considered the most desirable, related to, inter alia, with the construction of accommodation facilities (hotels, guesthouses) and / or sports and recreational facilities (e.g. ski lifts, swimming pools and bathing areas), or the development of spa and sanatorium services. Agri-food processing was in second place among the preferred economic activities in Małopolska communes. 26 communes (15,4% of the respondents) would like to see this type of activity in their area. Among these local government units, only 6 are urban-rural communes (Ciężkowice, Nowe Brzesko, Olkusz, Proszowice, Radłów, Wojnicz), the rest are rural communes.

In the strategic documents of 24 communes (14,2% of the respondents), the remaining industrial activity was listed as preferred. In most cases, it was not specifically indicated which production activities could be involved. Provisions regarding the preferred production activities were included only in strategic documents of the municipal commune of Oświęcim (chemical industry) and the rural commune of Nowy Targ (tanning plants). In the case of 10 communes in Małopolska (5,9% of respondents), the location of investments representing the so-called high technology. This group includes 4 municipalities (Bukowno, Kraków, Tarnówmentioned the production that is not harmful to the natural environment. 20 and 8 communes intend to develop the remaining service and commercial activities in their area, respectively.

The own study, based on, inter alia, the data of the Małopolska Economic Observatory, showed primarily the diversity of investment attractiveness, often poorly dependent or independent on the activities of local authorities. Indicators showing the attitude and pro-investment activities indicate that the activity of local authorities may be more important than "objective" indicators of investment attractiveness. The very high, objective investment attractiveness is not everything – it must be skillfully transformed into a good investment climate, and this does not guarantee success in attracting investors. Therefore, a high position in terms of the value of the synthetic index should be an incentive for even greater activity. On the other hand, a low investment cannot justify abandoning any activities, in particular those aimed at activating local resources. The image of attractiveness shown is averaged for different activities and sizes of investors. You can find a niche or

investment gap in every place. For some activities, the only address may be Krakow, but there are also those where Krakow will be the least suitable place. An example may be selected branches of the agri-food industry, for which agricultural communes may be the best, which in terms of the synthetic index were in the lowest positions, but for this branch of the economy they may be an attractive location. The analysis of individual climates and its comprehensive approach shows the way in which attractiveness is assessed by potential investors and consulting companies, supporting their decisions. You can find a niche or investment gap in every place. For some activities, the only address may be Krakow, but there are also those where Krakow will be the least suitable place. An example may be selected branches of the agri-food industry, for which agricultural communes may be the best, which in terms of the synthetic index were in the lowest positions, but for this branch of the economy they may be an attractive location. The analysis of individual climates and its comprehensive approach shows the way in which attractiveness is assessed by potential investors and consulting companies, supporting their decisions. Investors can find a niche or investment gap in every place. For some activities, the only address may be Krakow, but there are also those where Krakow will be the least suitable place. An example may be selected branches of the agri-food industry, for which agricultural communes may be the best, which in terms of the synthetic index were in the lowest positions, but for this branch of the economy they may be an attractive location. The analysis of individual climates and its comprehensive approach shows the way in which attractiveness is assessed by potential investors and consulting companies, supporting their decisions. An example may be selected branches of the agri-food industry, for which agricultural communes may be the best, which in terms of the synthetic index were in the lowest positions, but for this branch of the economy they may be an attractive location. The analysis of individual climates and its comprehensive approach shows the way in which attractiveness is assessed by potential investors and consulting companies, supporting their decisions. An example may be selected branches of the agri-food industry, for which agricultural communes may be the best, which in terms of the synthetic index were in the lowest positions, but for this branch of the economy they may be an attractive location. The analysis of individual climates and its comprehensive approach shows the way in which attractiveness is assessed by potential investors and consulting companies, supporting their decisions.

The level of fiscalism in the field of real estate tax and the increase in the number of new companies

In the area of local economy, tax stimulation may concern issues such as the structure and forms of running a business, creating and shaping taxpayers' investment, financial and consumption decisions, and finally also attracting foreign capital. The possibilities of using the structure of the real estate tax (excluding forest and

agricultural tax) were analyzed[3] and tax on means of transport to support the behavior of taxpayers in line with the directions of local government policy. The choice of these taxes results from the fact that they are the most fiscally efficient local property taxes, and due to the possibility of shaping the system of tax reliefs and exemptions, they can also act as a stimulus, e.g. in terms of increasing economic activity and locating (or relocating) new companies. In 2015-2020, real estate tax revenues increased from approximately PLN 11 billion to approximately PLN 15,8 billion, and revenues from the tax on means of transport increased from PLN 700 million to approximately PLN 832 million, respectively.

Property taxes (in kind) is all taxes related to property rights. From the point of view of the relationship between the tax burden and the taxpayer incurred it, we distinguish between direct and indirect taxes. Direct tax can be considered when there is a precisely defined relationship between the tax burden (type of tax, its amount, method of payment) and the taxpayer who incurs it directly. Thus, there is a link between the payment of the tax and the direct burden on the taxpayer. Thus, there is a convergence between the formal and material burden. Direct taxes are charged to the taxpayer in a way closely related to his income or property situation. Direct taxes include income taxes and property taxes. Direct taxes, and especially property taxes, are considered not to be passed on[4] but in fact it is not so, so the criterion of taxpayer unity and tax burden is inconsistent[5]. Therefore, it should be considered – taking into account the criterion of the relationship of the entity with the attributes assigned to it – that direct taxes are those that are precisely related to the permanent and inalienable characteristics of the taxpayer or measures of economic activity, which are assigned to it through property rights (income and property)[6].

The basic property of taxes is that they are always streams, as they are paid by subtracting part of other streams generated by economic agents. In order to pay a tax, they must give up a portion of their income - in the case of a direct tax, or of their expenses - in the case of an indirect tax; both of these are included in economic categories called streams. This feature of taxes is therefore called the stream logic of tax. The conclusion about the streaming nature of a tax is indeed trivial, but fraught with serious consequences - not always recognized. For since a tax is itself a stream, then, first, in its creation as a category of public finance, it should always be determined by proper reference to the value of some other stream; it should be created relative to that other stream, for example, relative to income, since only a stream is an effective source of income. Tax represents a monetary stream, and only to a monetary stream

[3] These taxes are of marginal fiscal importance in the budgets of local government units, and at the same time their structure makes it impossible to use these taxes in a flexible manner by local government bodies.

[4] More on the subject of shifting and the advantages and disadvantages of direct taxes: G. Szczodrowski, Polski system podatkowy, PWN, Warszawa 2007, p. 24-26.

[5] F. Grądalski, Wstęp do teorii opodatkowania, SGH, Warszawa 2004, p. 105.

[6] A. B. Atkinson, Optimal Taxation and the Direct versus Indirect Tax Controversy, "Canadian Journal of Economics" 1977; 6: 590-606.

must it be referenced. The paradox is the situation in which there is taxation of certain legal activities that are internal to companies. Here it turns out that surcharges to the company's capital stock are taxed; the company's contracts (articles of incorporation), amendments to contracts, etc., are subject to tax. The tax consequently becomes a sanction without any economic justification.

In the case of property taxes, the taxable amount for real estate tax or inheritance tax is the value of the property. The streaming nature of the tax means that the taxpayer has to pay it by returning part of the income stream. Therefore, if he does not have such a flow, he must spend the accumulated savings, possibly take out a loan for repayment, and finally even cash in all or part of his property (inheritance). Therefore, it seems rational to postulate that the wealth tax should not lead to a reduction in the taxpayer's property (property substance)[7]. A question may be asked whether, due to economic illogicality, the property tax should not be eliminated from the tax system? In my opinion, no, as long as income is taxed as it is generated by this property. This approach is economically rational, because although the subject of taxation is the property and the tax base is the value of that property, the tax is paid on the income stream from that property. Therefore, it is possible to indicate certain situations in which property taxation is justified, despite the fact that these taxes do not directly take into account in their structure the flow nature of taxation[8]:

First, this taxation makes sense when the income derived from the property is hidden and there is no formal basis for levying the tax on it. Thus, wealth tax can be a form of indirect income taxation, as it then retains its stream character.

Secondly, property taxation is justified when the state wants to put pressure on the owners of productive assets to use them properly. An example is the tax on construction land, which encourages landowners to make them profitable[9]. The willingness to put pressure on the economic operator to use property productively, or the willingness to tax hidden income, may also justify the taxation of large residential properties. However, the presumption of the taxing authority that the real estate is or can be used for rental for consideration, and therefore income is generated from it, may often be completely unjustified, and then the negative effects of property tax will take effect. Taxation of productive assets motivated by the desire to activate idle assets may, however, lead to a reduction in the incentive to invest. An entrepreneur who has the prospect of paying tax on inactive property – even when this property cannot be used productively through no fault of his / her own – will be afraid of taking the risk of investing, especially in an uncertain economic situation. In this way, the wealth tax has a weakening effect on the economic situation.

Third, property taxation is economically and socially justified when the owners of certain categories of property use state services related to that property, and the tax is a form of payment for these services. An example is the tax on means of transport (road construction and maintenance) or the adiacencka tax (increase in the value of real estate as a result of certain administrative and legal activities).

---

[7] S. Owsiak, Finanse publiczne. Teoria i praktyka, PWN, Warszawa 2002, p. 156.

[8] J. Żyżyński, Budżet i polityka budżetowa, PWN, Warszawa 2009, p. 178 and next.

[9] P. M. Gaudamet, J. Molinier, Finanse publiczne, PWE, Warszawa 2002, p. 481.

Fourth, property taxation is justified when the public authority deems it necessary to impose certain restrictions (high tax rates) on certain forms of property, when these forms are considered economically or socially undesirable, or when a certain way of creating such property is considered inappropriate. In fact, however, in such a situation, the stream is subject to taxation anyway – of income or transactions related to this property[10].

As regards the impact of the level of local fiscalism and the structure of the tax system on economic growth, there are often different views on this subject. Views on this can be divided into two groups. According to the first of them, the low level of tax burdens is conducive to increasing the investment attractiveness of the commune, therefore it is beneficial to lower the real tax rates in the resolutions of commune councils. At the same time, the attention is not paid to the structure of the tax system, but to the general level of the tax rate and the rate of fiscal burden expressed in the amount of tax (quota) rates. After some time, the reduction of communal budget revenues will be compensated by higher tax revenues, which are the effect of the economic boom. The second group of views questions the direct impact of low local taxes on economic growth, emphasizing the negative consequences of reducing budget tax revenues. The under-financing of some areas of the commune's functioning, eg education, local investments, etc., inhibits the growth rate of the commune's economic and social attractiveness. The supporters of these views also point out that the possible (may or may not) positive effects of tax cuts appear only after a few years, and budget losses immediately.

The relationship that is particularly emphasized is the correlation between the amount of fiscal burdens in personal income tax and the rate of economic growth. Much less attention in various analyzes is devoted to the issues of the impact of the structure of budgetary tax revenues on economic growth. The relationships between the level of fiscalism (the relation of tax revenues from property tax and tax on means of transport in relation to the number of new companies and the number of jobs created) for 25 LGU's in 2015-2020 will be presented below. Using the Pearson correlation coefficient, it is possible to examine the strength and direction of the relationship between the level of fiscalism and the number of new companies and the number of new jobs. The sign of the coefficient informs about the direction of the correlation and the absolute value about the strength of the relationship.

The correlation coefficient assumes values in the range [-1; 1]. The absolute value of the coefficient indicates the strength of the relationship between the two variables. The most closely related are the variables whose correlation coefficient is close to 1 or -1, and the weakest are those whose correlation coefficient is close to 0 (positive or negative). The sign of the correlation coefficient shows the direction in which the variables are related. When it is positive, there is a so-called positive correlation between the variables. This means that an increase (decrease) in the value of one variable is accompanied by an increase (decrease) in the value of the other variable.

[10] J. Żyżyński, Budżet i polityka… op. cit., p. 185-186.

When it is negative (the so-called negative correlation of variables), it means that an increase (decrease) in the value of one variable is accompanied by a decrease (increase) in the value of the other variable.

The obtained value of the linear correlation coefficient rxy = -0,26 indicates the existence of a statistically negative relationship between the two variables. The coefficient of determination obtained from the Pearson correlation coefficient allows us to conclude that the average rate of growth of new businesses and new jobs in the surveyed 25 municipalities in 10% is explained by the average level of fiscalism in both property taxes. Based on the above research results, it can be concluded that municipalities with maximum tax rates on property tax and transportation tax generate no lower rate of new business growth.

Assuming the assumption that taxes reduce incentives to work by reducing wage levels, then reducing the amount of taxes will increase incentives to work and increase income. This view is only partially correct, as taxpayers, as a result of a reduction in net income by a tax increase, may be mobilized to work to meet their consumption needs. In addition, an increase in net income, through a tax cut, may cause taxpayers to meet their consumption needs more quickly and the propensity for additional income-expansion activity will decrease. Thus, the effect of a reduction in the level of taxation may be to slow down the rate of new business growth, since a reduction in the level of tax rates improves the material situation of taxpayers, and consequently reduces the supply of labor. It should also be borne in mind that in a situation where the local tax system is "saturated" with numerous investment-type concessions, a reduction in taxes weakens their incentive effect.Research shows that in a short period of time it is difficult to show a relationship between the reduction of tax rates and the growth rate of local income. A negative correlation means that the growth in economic activity is lower, the higher the level of marginal tax rates. The obtained correlation coefficients are statistically insignificant, i.e. so small (rxy = 0,09) that there is no reason to reject the hypothesis of the existence of a relationship between the level of marginal tax rates in a short period of time. These results do not allow to confirm the theoretical postulates of the school of supply economics. Supporters of this school argue that the reduction of marginal tax rates generally leads to a reduction in labor costs, stimulation of consumption and production, and consequently a shift in the global supply curve. so that the equilibrium point of supply and demand would set a higher level of economic activity and lower prices. This action is to lead to economic growth and lower inflation. These actions may result in an increase in the trade deficit, caused by the growing demand for consumer and investment goods, and an increase in the capital surplus, due to an increase in the inflow of capital from abroad and a decrease in the outflow of domestic capital abroad.

In addition to the impact of the level of fiscalism itself on economic growth, it is also important to analyze the budget structure of local tax revenues (including fees). It will allow to answer the question of how particular types of fiscal revenues affect the growth dynamics of new companies and the increase of jobs. Two tax groups were analyzed. The first are property taxes (on real estate and means of transport), the

second are local taxes. By analyzing the impact of the share of property taxes in local fiscal revenues on the growth rate of new companies, we obtain a Pearson linear correlation coefficient of rxy = 0,11. The obtained value of the ratio means that there is no statistically significant correlation between the share of property taxes in fiscal revenues and the average annual GDP growth rate. We obtain similar results in the case of the study of the discussed relationship on an annual basis in individual years (2015-2020). By examining the strength and direction of the correlation between real estate tax and tax on means of transport separately, and the average annual growth rate of the number of new companies and the number of new jobs, we also obtain statistically insignificant relationships. The obtained correlation coefficients are respectively rxy = 0,04 and rxy = 0,39. Thus, the share of the most fiscally efficient taxes on property taxes in the structure of local budgets does not have a significant impact on the dynamics of growth in the number of new companies, both in the short and long term). By examining the strength and direction of the correlation between real estate tax and tax on means of transport separately, and the average annual growth rate of the number of new companies and the number of new jobs, we also obtain statistically insignificant relationships. By determining the strength and direction of the relationship between the share of local fees in the total own fiscal revenues and the average annual growth rate of new companies, we obtain a correlation coefficient rxy = -0,03. This result proves that there is no negative correlation between the examined variables.

The obtained results of the research do not allow to put forward the thesis that low property tax rates, even correlated with tax reliefs and exemptions, have a statistically significant impact on the location of new companies and job creation without detailed microeconomic analyzes.

Assessment of the impact of property taxes on the behavior of taxpayers, and consequently on the growth of new companies and jobs, requires taking into account the entire external environment, in which taxes are one of the important elements, but it is not an independent element that determines economic growth. A feature of the environment is both the fact that it can inhibit or stimulate economic growth, and the fact that it is shaped independently of the will of taxpayers. The following parts can be distinguished in the surroundings:

1. The state of the market (prices of goods, goods and services, exchange rates, labor costs in local terms, the state and intensity of competition, payment gridlocks, the state of the economic situation, etc.).
2. Road and rail infrastructure, local tax policy, local entrepreneurship development strategy, municipal investment policy, etc.
3. Social and material infrastructure (banking and insurance system, education, corruption, state of administration, justice, etc.).
4. Fiscal and monetary policy of the state (customs, state aid, budget deficit, interest rate, taxes and tax breaks, etc.).
5. Regulatory and administrative impact of the state (legal regulations in individual industries, labor market regulations, sanitary standards, shaping the quality of production, etc.).

Impact of taxation on local business development

Influence of taxes on supply and demand. In microeconomic terms, income taxes influence the shaping of demand, supply, and market equilibrium for a given good, as well as the decisions of producers, consumers and investors. Imposing or increasing a tax on a given good will cause a decrease in revenues from its sale as a result of a decrease in demand for them and a decrease in its net price. The increased gross price is covered in part by the seller and in part by the buyer. The proportions of their share in covering the increased price depend on such economic factors as the price of supply and demand, the possibility of the seller (producer) influencing the level and structure of own costs. In conditions of rigid elasticity of demand, the entire burden of imposing (increasing) the income tax will be borne by the buyer. If the elasticity of supply becomes rigid, this imposition or increase of taxation in these conditions will not cause a change in the gross price of a given good, but its net price will decrease by the amount of the imposed (increased) tax. The seller will bear the entire tax burden. If the demand for a good were infinitely elastic, the consequence of imposing or increasing the tax would be to limit the supply with the gross price increase, until the equilibrium price is reached, determined by the propensity of buyers to pay the higher price. Thus, the less flexible the supply and demand, the smaller the impact of income tax on a given type of economic activity, since the imposition (increase) of taxation does not cause major changes in the allocation of resources. The greater this flexibility, the greater the impact on resource allocations however, its net price will decrease by the amount of the imposed (increased) tax. The seller will bear the entire tax burden. If the demand for a good were infinitely elastic, the consequence of imposing or increasing the tax would be to limit the supply with the gross price increase, until the equilibrium price is reached, determined by the propensity of buyers to pay the higher price. Thus, the less flexible the supply and demand, the smaller the impact of income tax on a given type of economic activity, since the imposition (increase) of taxation does not cause major changes in the allocation of resources. The greater this flexibility, the greater the impact on resource allocations however, its net price will decrease by the amount of the imposed (increased) tax. The seller will bear the entire tax burden. If the demand for a good were infinitely elastic, the consequence of imposing or increasing the tax would be to limit the supply with the gross price increase, until the equilibrium price is reached, determined by the propensity of buyers to pay the higher price. Thus, the less flexible the supply and demand, the smaller the impact of income tax on a given type of economic activity, since the imposition (increase) of taxation does not cause major changes in the allocation of resources. The greater this flexibility, the greater the impact on resource allocations If the demand for a good were infinitely elastic, the consequence of imposing or increasing the tax would be to limit the supply with the gross price increase, until the equilibrium price is reached, determined by the propensity of buyers to pay the higher price. Thus, the less flexible the supply and demand, the smaller the impact of income tax on a given type of economic activity, since the imposition (increase) of taxation does not cause

major changes in the allocation of resources. The greater this flexibility, the greater the impact on resource allocations If the demand for a good were infinitely elastic, the consequence of imposing or increasing the tax would be to limit the supply with the gross price increase, until the equilibrium price is reached, determined by the propensity of buyers to pay the higher price. Thus, the less flexible the supply and demand, the smaller the impact of income tax on a given type of economic activity, since the imposition (increase) of taxation does not cause major changes in the allocation of resources. The greater this flexibility, the greater the impact on resource allocations Thus, the less flexible the supply and demand, the smaller the impact of income tax on a given type of economic activity, since the imposition (increase) of taxation does not cause major changes in the allocation of resources. The greater this flexibility, the greater the impact on resource allocations Thus, the less flexible the supply and demand, the smaller the impact of income tax on a given type of economic activity, since the imposition (increase) of taxation does not cause major changes in the allocation of resources. The greater this flexibility, the greater the impact on resource allocations[11].

Income tax affects the price of the taxed good, and the increase in the price affects the market situation. Increasing tax rates may result in a situation where the taxpayer's gross income for tax remains unchanged - then his net income after tax decreases, or the taxpayer manages to increase gross income, so that his net income after tax does not decrease. In the first case, an increase in taxation may translate into either a decrease in direct consumption or a decrease in savings. The decrease in consumption translates into a decrease in indirect taxation revenues, unless the increase in income tax rates is accompanied by an increase in indirect tax rates. This, however, may cause either a further decline in consumption or a decline in savings and the supply of capital.

In a market economy, allocation decisions are more or less related to the monetary savings of entities. The propensity of entities to save depends both on the interest rate on deposits and inflation, and on the tax rate on capital income (savings). Also, the propensity to invest by economic entities depends on the income from the invested capital. High burdens of capital income may limit its marginal efficiency, causing investments to be allocated in preferential taxed sectors but with lower efficiency, which at the same time distorts investment decisions[12].

---

[11] S. Owsiak, Finanse publiczne. Teoria a praktyka, PWN, Warszawa 1997, p. 155-158, 172-175.

[12] Some researchers suggest the existence of a statistically significant impact of taxes on investment. The flexibility of the investment in relation to the cost of capital ranges from 0,25-1,0. In the US, every billion dollars in tax revenue decrease was accompanied by an increase in R&D spending by approximately $ 2 billion. There are suggestions in the literature that the abandonment of the capital tax and the introduction of the consumption tax mean that investment decisions are not distorted by tax policy. With inflation of 3%, investment financing half with debt, half with equity, and a shift from taxing capital to consumption tax, investment increases by 10% and increases social wealth from a permanent reduction in capital taxes ranging from 25 cents to one dollar. for a one-dollar reduction. Low inflation is the best means of supporting investments as it lowers the cost of capital (high inflation translates into a rising interest rate, it also reduces profits on the stock market and this discourages investing in

Undoubtedly, high taxation limits private investment by reducing the proportion of income potentially earmarked for investment, leaving taxpayers only with sufficient resources for consumption. Some researchers[13,14] take a different view, proving that a high level of fiscal burden does not reduce the attractiveness of risk-free investments compared to risk-free investments for two main reasons. First, taxation reduces the overall level of a taxpayer's income, which may change the attitude towards risk. This effect occurs regardless of the form and method of income taxation, and depends only on the amount of tax, i.e. the scale of the reduction of income after tax. Whether the tax reduces or increases risk-taking depends on the shape of the utility function. Second, as Young argues, high effective taxation reduces the scope of expected income after tax, prompting operators to take risks. Of course, Young's assumptions may seem somewhat controversial, because high effective tax rates, by reducing the taxpayer's income, do not necessarily induce him to increase risk. Moreover, Young adopts a simplifying assumption that all taxpayers do not differ in the degree of risk aversion, thus concluding that a non-negative tax scale is risk neutral if and only if it equalizes either an absolute or a proportional sacrifice[15]. If U (x) represents utility for income x in the absence of taxation, at = f (x) is the tax scale, then V (x) = U (x - t) is the taxpayer's utility for after tax income. The tax scale is risk--neutral if the taxpayer makes the same choices in taxation and in the absence of taxation. Since the utility of von Neumann – Morgenstern is determined for a positive linear transformation, it is the same as saying that V (x) = U (x - t) = AU (x) - B for A > 0. If A = 1, then U (x) - U (x - t) = B, it means that t equalizes absolute sacrifice. In a situation where A ¹ 1, and b = B (1 - A), then [U (x - t) + b] / [U (x) + b] = A. By assumption t ³ 0, and U is ascending, so A < 1. So the tax equalizes the sacrifice at a rate of 1 – A[16,17]. It should be noted that the above argument has some weaknesses. First, the utility function cannot be estimated individually for each taxpayer, and therefore individual taxpayers' decisions should not be "averaged". Moreover, the degree of risk aversion varies, which significantly affects the division of social roles and the social division of labor, as well as consumption and investment decisions made by taxpayers.

In the light of the clastic theory of economics, the amount of savings of households (companies – shareholders) is influenced by the rate of return on savings, which constitute "non-consumed" income. Savings are the result of the choice of a specific consumption structure by households over time by comparing the subjective value of current consumption against future consumption (discount rate) with the market

companies increasing capital). The combination of anti-inflationary monetary policy and the shift from income tax to consumption tax significantly stimulate investment. Research suggests high flexibility of the capital stock in terms of its cost over a long period of time.

[13] H. P. Young, Eguity. In Theory… op. cit.

[14] H.P. Young, Progressive Taxation and Equal Sacrifice, "The American Economic Review" 1994; 80: 255.

[15] Taxpayers clearly differ in the degree of risk aversion, so there is no tax function that is neutral for each taxpayer.

[16] See more: H. P. Young, Eguity. In Theory and Practice, Princeton 1994, p. 112.

[17] H. P. Young, Progressive Taxation and Equal Sacrifice… op. cit.

interest rate determining the degree of increase in future consumption as a result of abandoning current consumption (interest rate). Taxation of capital gains (interest on bank deposits, bonds, units in investment funds, dividends on company shares) reduces the effective rate of return, thereby lowering the savings remuneration. As a consequence, one should expect a decrease in the level of savings (substitution effect), but there is also an income effect – a decrease in the effective rate of return on savings translates into a reduction in the level of household wealth. This may limit current and future consumption. Limiting current consumption may result in an increase in the level of savings. The effect of a decrease in the real net rate as a result of taxation of savings income is not clearly defined due to the occurrence of substitution and income effects. Economic research shows that in the long run the substitution effect is stronger than the income effect and a decrease in the net return rate is in line with a decrease in the supply of savings This may limit current and future consumption. Limiting current consumption may result in an increase in the level of savings. The effect of a decrease in the real net rate as a result of taxation of savings income is not clearly defined due to the occurrence of substitution and income effects. Economic research shows that in the long run the substitution effect is stronger than the income effect and a decrease in the net return rate is in line with a decrease in the supply of savings This may limit current and future consumption. Limiting current consumption may result in an increase in the level of savings. The effect of a decrease in the real net rate as a result of taxation of savings income is not clearly defined due to the occurrence of substitution and income effects. Economic research shows that in the long run the substitution effect is stronger than the income effect and a decrease in the net return rate is in line with a decrease in the supply of savings[18].

If, in the long run, tax cuts lead to an increase in the local budget deficit, taxpayers expect an increase in taxes in future periods (or an increase in utility prices). Taxpayers will save a portion of the additional disposable income derived from the tax cut, seeking to even out the distribution of consumer spending over time. Assuming intergenerational altruism, we get the same effect, regardless of whether taxes will increase during the life of the household or whether the increase in taxes will affect its descendants. Thus, we are dealing with a substitution between savings in the public and private sectors, with the studies of the economies of the EU countries and the American economy not confirming the full substitution of public savings with private savings[19]. If households treat the retained earnings of their enterprises as

[18] The results of the estimation of savings elasticity carried out on the basis of OECD countries data do not confirm the strong correlation between the real interest rate and the supply of savings, which may undoubtedly be influenced by the liberalization of financial markets and the scale of international capital flows. Panel studies conducted on 21 OECD countries showed that taxation of income from capital causes a small but statistically significant decrease in savings (the elimination of the tax on capital gains with an average rate of 40% translates into an increase in savings by about 0,5% of GDP). See more: V. Tanzi, H. H. Zee, Taxation and the Household Saving Rate: evidence from OECD countries, „IMF Working Paper" 1998.

[19] The correlation coefficient is below one, and some deviations only apply to special cases (rapid increase in the budget deficit, substitution between public savings and private savings in the pension and social security sector).

their own savings, the level of taxation of corporate income may significantly affect household savings. Households can save more when firms keep less profits and save less when firms keep more profits. In a situation where the marginal propensity to save of households with a significant share in corporate profits is higher than the average in the population, an increase in the tax burden on corporate profits (income) combined with a reduction in personal tax may result in a reduction in the aggregate private sector savings[20]. Summing up, it can be concluded that the growing taxation of savings income may lead to a decrease in aggregate savings stimulating investment goals, mainly by reducing disposable income, lowering the return on savings and the transfer of income between households with different propensity to save.

The factor that has a significant impact on the size of the investment is the cost of capital, depending on the interest rate[21,22]. Taxing investment income or savings increases the difference between the pre-tax return on investment and the post-tax return on savings. Thus, it is a specific tax wedge between the supply of savings and the demand for capital, which generates a decrease in the net return on savings and an increase in the gross return on investment and, consequently, a decrease in investment outlays[23]. When analyzing the impact of taxation of investment income, one should focus on effective tax rates, because very often lowering nominal (statutory) rates does not have to positively stimulate investment growth, if the accompanying changes in tax law (e.g. elimination of tax reliefs) lead to an increase in real tax burdens.

Social and economic development of the commune in the context of the level of own tax revenues

The multiple linear regression method was used to assess the relationship between the variables characterizing the growth of new companies and jobs and the variable describing own income from property tax and tax on means of transport of shrinking cities. This method is used to show a statistically significant linear relationship between the dependent variable and the explanatory variables. It also makes it possible to indicate the strength and direction of this relationship by interpreting the

[20] E. Nojszewska, M. Rojek, Rozważania na temat konsekwencji wprowadzenia reformy podatkowej w Polsce – inwestycje z uwzględnieniem oszczędności oraz rynek pracy z uwzględnieniem kapitału ludzkiego, [in:] Kierunki reformy polskiego systemu podatkowego, A. Pomorska (ed.), UMCS, Lublin 2003, p. 153.

[21] See more: R. Gordon, M. Dietz, Dividends and Taxes, NBER, Working Paper 12292, June 2006; A. J. Auerbach, Who Bears the Corporate Tax? A review of what we know, NBWR, Working Paper 11696, October 2005; A. J. Auerbach, K. Hassett, Dividend Taxes and Firm Valuation: New Evidence, NBER, Working Papers 11959, January 2006.

[22] A. J. Auerbach, The Future of Capital Income Taxation, "Fiscal Studies" 2006; 24(4): 399-420.

[23] The complexity of tax law through numerous tax reliefs and exemptions, rules for deducting depreciation write-offs, inventory valuation, deduction of foreign exchange gains and losses, etc., results in the lack of a simple relationship between the gross return on investment and the net return on savings, determined by statutory tax rates.

parameters of a linear equation (econometric model). The spatial scope of the research covered 25 communes of Małopolska, where reduced tax rates were observed and numerous incentive tax reliefs and exemptions were introduced into local law. The time scope of the research covered the years 2015-2020. In the conducted research, the explained variable (Y) was assumed to be the share of own income from property tax and tax on means of transport of income in total tax income of municipalities. It is the basic indicator describing the income independence of municipalities, which synthetically presents the most important sources of own income. The explained variables (Xn) were indicators that relate to the development of entrepreneurship through the increase in the number of new companies. The following variables were used in the research, which are also variables describing significant subelements stimulating the development of local entrepreneurship, distinguished on the basis of the author's interviews with the authorities of the surveyed communes. The adopted variables are: the degree of development of water supply and sewage infrastructure, (X1); the degree of development of road infrastructure and the amount of land prepared for investment (X2); number of natural persons running a business per 100 persons of working age (X3), number of entities of the national economy per thousand persons (X4), value of the relation of newly registered entities to entities removed from the REGON register per ten thousand people (X5); share of the registered unemployed in the working-age population (X6), the share of the employed in the working-age population (X7); number of post-working age population per one hundred working age population (X8), net internal migration in the commune (X9), net international migration in the commune (X10). In order to make a correct inference from linear regression analysis, the assumptions of this method must be met. In the research, they were verified by the following tests: linearity of the model with respect to parameters (Ramsey test), number of observations (municipalities) is greater than or equal to the number of estimated parameters, significance of parameters (Student's t-test), no collinearity of parameters, the expected value of the random component is equal to zero, the random component is homoscedastic, and the random component is normally distributed. The above assumptions were tested at the significance level of p = 0,05. Econometric calculations were made in Statistica and Excel the random component is homoscedastic and the random component is normally distributed. The above assumptions were tested at the significance level of p = 0,05. Econometric calculations were made in Statistica and Excel the random component is homoscedastic and the random component is normally distributed. The above assumptions were tested at the significance level of p = 0,05. Econometric calculations were made in Statistica and Excel.

As shown by the multivariate linear regression analysis, revenues from property tax and tax on means of transportation as a proportion of total tax revenues, as well as the saturation of the local tax system with concessions and exemptions, were not statistically significantly related to factors of local entrepreneurship development, as measured by the growth of new businesses and jobs. This proves the lack of relevance of the hypothesis adopted in the study assuming a relationship between

the amount of taxes on real estate and means of transportation, as well as concessions and exemptions in these taxes, and the growth of new businesses and jobs. The multivariate linear regression equation can be written in the following form: Y = 32,19 + 0,45X3 – 0,40X6 + 0,01X7 + e. A multivariate linear regression analysis was also carried out for municipalities where significant investments were made in road infrastructure and site preparation. The multiple linear regression equation can be written as follows: Y = 53,94 + 1,37X1 – 0,67X6 + 0,29X7 + e. The interpretation of the parameters of the obtained equation is analogous to the previous equation. Thus, the obtained result can be interpreted in such a way that the greater the scale of the process of preparing economic and social infrastructure for investment, the more forms located their centers in the municipality. The conducted research confirms the thesis that the competitiveness of a commune is a product of the behavior of both economic entities (taxpayers) and local government. The tasks of the local government commune include, first of all, the creation of an appropriate macroeconomic climate, conducive to the functioning of economic entities at the microeconomic level. This statement is of particular importance in relation to economic entities, including transport companies, which are not able to exert a significant influence on the environment (e.g. infrastructure, local taxes, etc.). Therefore, it can be assumed that the competitiveness of companies depends to a much greater extent on the nature of external conditions and the ability to adapt to these conditions. Therefore, it depends to a much greater extent on the socio-economic policy implemented in the country (contributions, concessions, formal requirements, etc.) than local tax policy. Assessment of the impact of a reduction in tax rates on means of transport and real estate tax on the behavior of taxpayers and, consequently, on the theoretical increase in the number of companies (increasing the tax base of a given Rzeszów commune) requires taking into account the entire external environment, in which both analyzed taxes are one of the important elements, but not it is an independent element that determines the stimulating function of the rate reduction. A feature of the business environment is both the fact that it can inhibit or stimulate the profitability of individual companies and the entire industry, and that it is shaped independently of the will of taxpayers.

Assessment of the impact of a reduction in tax rates on means of transport and real estate tax on the behavior of taxpayers and, consequently, on the theoretical increase in the number of companies (increasing the tax base of a given Rzeszów LGU) requires taking into account the entire external environment, in which both analyzed taxes are one of the important elements, but not it is an independent element that determines the stimulating function of the rate reduction. A feature of the business environment is both the fact that it can inhibit or stimulate the profitability of individual companies and the entire industry, and that it is shaped independently of the will of taxpayers. Assessment of the impact of a reduction in tax rates on means of transport and real estate tax on the behavior of taxpayers and, consequently, on the theoretical increase in the number of companies (increasing the tax base of a given Rzeszów commune) requires taking into account the entire external environment,

in which both analyzed taxes are one of the important elements, but not it is an independent element that determines the stimulating function of the rate reduction. A feature of the business environment is both the fact that it can inhibit or stimulate the profitability of individual companies and the entire industry, and that it is shaped independently of the will of taxpayers. in which both examined taxes are one of the important elements, but not an independent element that determines the stimulating function of the reduction in rates. A feature of the business environment is both the fact that it can inhibit or stimulate the profitability of individual companies and the entire industry, and that it is shaped independently of the will of taxpayers. in which both examined taxes are one of the important elements, but not an independent element that determines the stimulating function of the reduction in rates. A feature of the business environment is both the fact that it can inhibit or stimulate the profitability of individual companies and the entire industry, and that it is shaped independently of the will of taxpayers.

The following parts can be distinguished in the surroundings:

1. The state of the market (prices and exchange rates, the state and intensity of competition, payment gridlocks, the state of the economic situation, etc.).
2. Social and material infrastructure (banking and insurance system, education, corruption, state of administration, justice, etc.).
3. Fiscal and monetary policy of the state (customs, state aid, budget deficit, interest rate, taxes and tax breaks, etc.).
4. Regulatory and administrative impact of the state (legal regulations, labor market regulations, EU sanitary standards, shaping the quality of production, etc.).

LGU's have a wide set of instruments for stimulating entrepreneurship development, but they are very rarely used in the form of a comprehensive and well-thought-out strategy with multifaceted impact. The instruments of municipal support for entrepreneurship development can be divided into two main categories: financial and non-financial. The main financial instruments include: revenue instruments of budget policy (local taxes and fees), investment spending, external sources of financing (bank credit, municipal bonds and EU funds) and public-private partnerships. The main non-financial instruments include: the effectiveness of the municipality's promotion, investor services, social policy, support for innovation, the "climate" around public procurement, business incubators, industrial parks, and the use of consulting assistance. The essence of the commune's competitiveness can be understood as the ability to compete effectively, leading to the achievement of maximum benefits. Economic and investment competitiveness of a commune is one of the partial competitiveness of a commune, understood as the ability to achieve a high position in the field of economic and investment attractiveness[24].

Based on the results of the author's own research (case studies of 100 companies), it can conclude that the key factors that determined the choice of the location of the business are:

[24] Among other types of partial competitiveness of a commune, we can distinguish: environmental, cultural, climatic, social competitiveness, etc.

1. Infrastructure (banks, leasing companies, the labor market, the state of the market) and the proximity and accessibility of the commune, the quality of communication routes. 70% of indications in questionnaires for these features.
2. Proximity of main clients, easy implementation of business functions (offices, institutions, etc.). 10% of indications in questionnaire surveys.
3. Only 12% mentioned the rates of local taxes and fees, but for 70% of entities the most important were the rates of rent and rent, water and real estate tax rates or parts thereof used for business activities.

Financial instruments of the commune's budgetary influence on the development of entrepreneurship and economic and investment competitiveness of the commune can be considered from the point of view of their effectiveness and efficiency. However, this is not an easy task. Determining the effectiveness of the tax instruments or investment expenditures used by the commune requires a detailed analysis of the effects of changes caused by them, both in individual economic entities and in the scale of the entire community. This analysis is not always possible and is very expensive. Similarly, many difficulties are caused by examining the degree of effectiveness. In addition to the correct diagnosis, it is necessary to quantify these identified changes, which are qualitative in nature. It is very difficult to quantify the correlation between the importance for the development of a given commune, e.g.

Development of local entrepreneurship from the perspective of various support instruments - financial and non-financial

The tax policies of communes have been divided into two groups. Firstly, the policies for harmonizing tax regulations in the local perspective – they were considered using models of the impact of these policies on local demand and the growth of new companies, as well as policies in the field of tax burdens, determining how the tax burden is divided between two local taxes – real estate tax and means of transport (the application of these policies was considered from the supply side). From the point of view of local economic policy, an important issue is the answer to two questions. First, what would be the effects of applying a different policy in terms of the amount of tax burdens and the applied reliefs over a certain historical period, and would a change of policy be beneficial in terms of a faster growth rate in the number of new economic entities? Secondly, what possible effects can be achieved in the future as a result of changing the policy of unifying tax regulations in the local approach to a different one in relation to the continuation of the current policy? The answer to these questions is crucial when it comes to assessing the quality of the tax policy of municipalities applied so far and possible options for the future. The key assumptions made in this simulation can be defined as follows. Firstly, the change by a given commune of the tax policy (unifying tax regulations) to the policy applied by another commune produces the same or similar effects as in the neighboring commune (competitive in terms of location). This means that the strength and direction

of the impact of the variables that unify tax policies on the number of new companies after the adoption of the new policy is the same as in the country, from which this policy comes. Secondly, the remaining variables affecting the number of newly remaining companies in the commune changing the tax policy have an unchanged effect, which means the adoption of the ceteris paribus principle. However, this unchanged level of impact on the number of new firms of the remaining variables may also be analyzed and may affect the size of the increase in new firms and jobs.

The following variables were distinguished as part of the study:

- X1t – the size of the local budget (the value of the budget of the examined commune),
- X2t – the amount of own tax revenues in total budget revenues,
- X3t – commune investment expenditure,
- X4t – municipal social expenses,
- X5t – promotional expenses of the commune,
- Y1t – index for Unifying Property Tax Rates,
- Y2t – index of harmonization of tax rates on means of transport,
- Y3t – Local Services Price Unification Index,
- Z1t – subsidies and subsidies,
- Z2t – co-financed commissioned tasks.

These variables were used with time lags reaching the period t-4. Quarterly data on time series are taken from the Eurostat Metabase. For model estimates, in order to meet the stationarity postulate, variables were used that were the difference of logarithms of the variable in the period t and of the same variable in the period t-1. The transformed variables had very interesting properties. They represented the logarithms of the quarterly rate of increase or decrease of a given economic quantity. For example: X1 = lnX1t - lnX1t-1 = ln (X1t / X1t-1). Having the estimated values of X1t and the delayed value X1t-1, it was possible to estimate the absolute values of X1t transformed according to the formula:

$$(X1t / X1t\text{-}1) = eX1t, \text{ that is: } X1t = X1t\text{-}1 \text{ xe } X1X1t$$

Estimates of X1 in the form of log differences have been reduced to absolute values using the properties of the logarithms specified above. The following procedure was used to estimate the effects of the policy of unifying tax regulations on a local basis on a different one in relation to the continuation of the existing policy: regression models were estimated in which the explained variable is X1t and the explanatory variables are components stimulating the local development of entrepreneurship, measured by the number of new companies and jobs: X2t, X3t, X4t, X5t and variables in the field of unifying tax regulations in the local approach, i.e.: Y1t, Y2t, Y3t for 20 LGU's. All estimated regressions had good and very good econometric properties. The X1t regression errors were not large. This allowed for the adoption of a simplification, that the estimates are simulation regressions and that they represent constant and time-invariant linear relationships. These estimates are called simulation regression functions. It was assumed that the explanatory variables in simulation regression functions may be delayed. In the

regression functions for all communes, it was assumed that the changed policy of unifying tax regulations in the field of real estate tax and tax on means of transport exactly copies the way of influencing another commune in which such a policy was applied before, leaving the impact of other variables unchanged. These types of functions are called simulation regression functions. The simulation regression functions have been developed in two variants: when accepting time delays of a commune changing the policy and when accepting time delays from the commune from which a given policy comes and is implemented. The following estimates of the linear regression function X1t were obtained for selected 5 municipalities marked with letters from A to E depending on the factors stimulating the increase in the number of new companies and the variables unifying the tax policy at the local level.

Table 1. Estimates of the linear regression function X1t were obtained for selected 5 municipalities marked with letters from A to E

Variable	X1t				
	LGU A	**LGU B**	**LGU C**	**LGU D**	**LGU E**
X2t	0,78498	0,26524	0,59702	0,40490	0,59033
X3t	0,20757	0,11774	0,18698	0,095524	0,29441
X4t	0,23168	0,1345	0,66842	0,052638 (t-1)	0,72973
X5t	-0,34158	-0,14452 (t-3)	-0,48873	0,086026	-0,71580
Y1t	-0,060931 (t-1)	0,21510 (t-3)	0,20393 (t-2)	-0,63618	0,13315 (t-4)
Y2t	0,020619 (t-1)	0,28506 (t-3)	0,20370	-0,13517 (t-3)	-0,14716
Y3t	0,00456	-0,20527 (t-1)	0,1109	-0,1450	0,031420 (t-4)
Z1t	0,0017793 (t-1)	0,0034582	-0,0028525	-0,0987	0,04560
Z2t	0,0061405 (t-3)	-0,021503 (t-1)	0,011013 (t-1)		
Ut	0,00114533	0,0036941	0,0021462	0,0013855	-0,0015183
R2	0,97548	0,94967	0,96863	0,99066	0,99152
DW	2,1997	2,0098	2,1592	1,9853	2,4594

Source: own elaboration

The obtained results were confronted through face-to-face interviews with employees of the analyzed 20 municipalities. Research of a "soft" nature confronted with budget data confirms the thesis that the local tax policy itself (adopted tax strategy) is not the only and sufficient (often not very important) factor determining the investment attractiveness of a given municipality expressed in the number of new companies, new investments and, consequently, new jobs. The study of the strategic documents of 20 municipalities and adopted strategies in various areas of socio-economic development, including in-depth face-to-face interviews, allows us to formulate the following conclusions.

Conlusions

It is important for the socio-economic development of the municipality to have a long-term development strategy or a study of the conditions and directions of spatial development or other similar document positively influences entrepreneurship, as the vast majority of municipalities (85%) are characterized by high values of Pearson's correlation coefficient rxy = 0,69 (the influence of the strategy on the increase in the number of new companies). An effective instrument for supporting entrepreneurship is also the local zoning plan, along with the preparation of specific investment trenches (preparation of land with technical development – access roads, power and sewage network, gas network and a special fast way to serve entrepreneurs, etc.). Analyses showed that 80% of municipalities that had a plan were characterized by high correlation values Persona rxy = 0,63 (the influence of a comprehensive land use plan with full preparation of land for investment on the increase in the number of new companies). The research further showed that informing interested parties about available funding opportunities on municipal websites is an effective instrument for supporting entrepreneurship. The largest number of municipalities declaring the use of the Internet for the purpose in question is characterized by the highest level of new business growth. Mass media are another effective instrument for informing people about available funding opportunities, despite the fact that they were used less frequently as brochures, whose effectiveness was not confirmed.

The research shows that ain order to raise the level of entrepreneurship in the commune, loyal authorities should undertake marketing activities, advertise the commune outside, help in finding free land or premises, assist in the recruitment and training of employees, provide advice, including legal and financial advice, and provide individual services in registering business activities , run the unit's website, preferably translated into foreign languages, promote the commune at foreign fairs and have a separate organizational unit or position for servicing foreign investors. There is no doubt that municipalities they use a diverse range of activities supporting the development of entrepreneurship.

However, it is difficult to clearly indicate which of the activities are more effective than others, but it can certainly be indicated that the use of one selected tool will not bring such good results.effects, such as the use of a whole well-chosen and

constructed support system for newly established enterprises. For example, the reference to tax preferences as the main (main) determinant of stimulating entrepreneurship is not decisive (as shown in the research). As a result of the conducted analyzes, it can be concluded that the key, apart from the above-mentioned preferences, and sometimes even more important, is infrastructure and the policy of its development, as well as the instruments used, such as: fast administrative path, as well as predictability of local financial policy (expressed in e.g. a moderate increase in the level of taxes and local fees) and a stable pricing policy for municipal services.

Bibliography

Atkinson A.B., Optimal Taxation and the Direct versus Indirect Tax Controversy, "Canadian Journal of Economics" 1977; 6: 590-606.

Auerbach A. J., Who Bears the Corporate Tax? A review of what we know, NBWR, Working Paper 11696, October 2005.

Auerbach A.J., Hassett K., Dividend Taxes and Firm Valuation: New Evidence, NBER, Working Papers 11959, January 2006.

Auerbach A.J., The Future of Capital Income Taxation, "Fiscal Studies" 2006; 24(4): 399-420.

Gaudamet P.M., Molinier J., Finanse publiczne, PWE, Warszawa 2002.

Gordon R., Dietz M., Dividends and Taxes, NBER, Working Paper 12292, June 2006.

Grądalski F., Wstęp do teorii opodatkowania, SGH, Warszawa 2004.

Guzik R., Gwosdź K., Działka J., Klimat inwestycyjny w województwie małopolskim, Małopolskie Obserwatorium Gospodarki, Kraków 2013

Nojszewska E., Rojek M., Rozważania na temat konsekwencji wprowadzenia reformy podatkowej w Polsce – inwestycje z uwzględnieniem oszczędności oraz rynek pracy z uwzględnieniem kapitału ludzkiego, [in:] Kierunki reformy polskiego systemu podatkowego, Pomorska A. (ed.), UMCS, Lublin 2003.

Owsiak S., Finanse publiczne. Teoria a praktyka, PWN, Warszawa 1997.

Szczodrowski G., Polski system podatkowy, PWN, Warszawa 2007.

Tanzi V., Zee H. H., Taxation and the Household Saving Rate: evidence from OECD countries, „IMF Working Paper" 1998.

Young H.P., Eguity. In Theory and Practice, Pronceton 1994.

Young H.P., Progressive Taxation and Equal Sacrifice, "The American Economic Review" 1994; 80: 255.

Żyżyński J., Budżet i polityka budżetowa, PWN, Warszawa 2009.

*Sylwia Skrzypek-Ahmed**
*Andrzej Gwiżdż***
*Nghargbu K'tso****
*Jerzy Gilarowski*****

EVOLUTION OF THE PROCESS MANAGEMENT CONCEPT IN AN ORGANISATION INCLUDING QUALITY SYSTEMS (SELECTED PROBLEMS)

Ewolucja koncepcji zarządzania procesowego w organizacji z uwzględnieniem systemów jakości (wybrane problemy)

*PhD., Assoc. Prof., WSEI University in Lublin, ORCID: 0000-0002-1211-0683
**Dr., School of Business – National-Louis University in Nowy Sącz (WSB-NLU), ORCID: 0000-0001-5551-973X.
***Prof., Director Linkages & International Cooperation Nasarawa State University Keffi in Nigeria, ORCID: 0000-0002-6320-6722
****Prof., University of Dar Es Salaam Mkwawa University College of Education in Tanzania, ORCID: 0000-0002-9516-0554

Streszczenie

Zarządzanie procesowe polega na traktowaniu wszystkich zadań w organizacji jako pewnego rodzaju ciągu sekwencji, które zgrupowane są w ramach jednego procesu. Celem organizacji staje się efektywne zaspokojenie potrzeb klienta poprzez realizację własnych celów strategicznych i operacyjnych, definiowanych na bazie wartości dodanej wytwarzanych dla klienta dóbr oraz usług. Taka struktura zadań generuje większą skuteczność działania, efektywniejsze wykorzystanie zasobów i potencjału pracowników oraz ustrukturalizowany wzrost ich kompetencji. Sprawność działań przedsiębiorstwa jest weryfikowana oraz realizowana poprzez identyfikowanie, projektowanie i optymalizowanie procesów, standaryzowanie działań i sterowanie ich przebiegiem. Takie podejście daje możliwość elastycznego dostosowania się do otoczenia i zmian w nim zachodzących. Przewaga konkurencyjna budowana jest na podstawie dynamiki działania i efekt, a nie realizację poszczególnych zadań oraz czynności.

***Słowa kluczowe**: zarządzanie procesowe, zarządzanie jakością, systemy jakości, zarządzanie funkcjonalne, racjonalność ekonomiczna, optymalizacja działań, potrzeby klienta, zarządzanie efektywne*

Summary

Process management consists of treating all tasks in an organisation as a kind of sequence, which are grouped under one process. The aim of the organisation becomes the effective satisfaction of customer needs through the realisation of its own strategic and operational goals, defined on the basis of the added value of the goods and services produced for the customer. This structure of tasks generates greater efficiency, more effective use of resources and employee potential, and a structured increase in their competences. The efficiency of a company's operations is verified and realised by identifying, designing and optimising processes, standardising activities and controlling their course. This approach offers the possibility to flexibly adapt to the environment and changes in it. Competitive advantage is built on the dynamics of action and effect, rather than the implementation of individual tasks and activities.

Key words: process management, quality management, quality systems, operational management, economic efficiency, optimisation of performance, customer needs, effective management

Introduction

In each organisational unit there are two basic groups of processes: basic processes (also called main or key processes), these are processes for the implementation of which the unit was established and which result directly from the statutory activity of the organisation, are strategic for it and largely contribute to the achieved financial results, the main feature of this group of processes is the creation of added value; and auxiliary processes (also called supporting processes), these are processes whose purpose is, as the name suggests, to support the functioning and implementation of key processes; one of their basic features is not the creation of added value as in the case of basic processes, but the generation of additional costs[1].

In management systems, due to the nature of the global interaction in the organisation, an additional group of processes can be distinguished from the auxiliary processes, the so-called management processes. A characteristic feature of this group of processes is that they have a unidirectional effect and control the primary and secondary processes in terms of measuring their optimisation, establishing compliance with requirements and objectives as well as verifying the status of the implementation of preventive or corrective actions to non-compliances that have arisen. Management processes are responsible in an organisation for[2]:

[1] M. Zairi, Sinclair D., Business process re-engineering and process management, „Business Process Re-engineering & Management Journal" 1995; 1(1): 7-8.

[2] R. Wysocki, Efektywne zarządzanie projektami/Tradycyjne, zwinne, ekstremalne, HELION, Gliwice 2013.

- vision building, i.e. setting the direction of the organisation,
- strategic planning, i.e. they plan the realisation of predetermined goals over a longer time interval (more than one year),
- short-term planning, i.e. they plan the realisation of predetermined short-term operational goals (up to one year),
- setting short- and long-term objectives,
- resource allocation, i.e. they manage and supervise the resources held by the organisation (financial resources, physical resources and human capital),
- human capital management,
- monitoring and evaluation of activity, i.e. they carry out evaluation of the compliance of the actual state with the accepted assumptions and requirements in the identified processes and grade the organisation's activity on the basis of the information collected and analysed.

The management processes in each organisational unit (which has a management system) are similar and oversee the following areas[3].

Documentation functioning in the organisation, (requirement – clause 4.2.3 of ISO 9001:2008). One of the most important aspects of management is the development and supervision of a set of documents determining the requirements on the basis of which the organisation functions. Correctly designed documentation constitutes the framework as well as the foundation on which the management system is built. All persons occupying specific positions in the organisation must at all times have at their disposal up-to-date external and internal regulations defining the scope of their work and responsibilities. A necessary and absolute condition for the functioning of any organisation is to ensure the correct circulation and supervision of the creation, distribution and validity of documents affecting the correct functioning of identified processes, but also to ensure the smooth flow of communication at every level of management.

Created in the course of current work - records, in accordance with point 4.2.4 of ISO 9001:2008. Both in the case of the documentation functioning in the organisation and the records created in the course of its processing, their supervision is important from the viewpoint of the management system. The essence of supervision over the records is to ensure their traceability, accessibility and, what is important, preparation of records and their later storage, among others for the purpose of preparation of various reports, analyses, as well as providing evidence during the audit.

Internal audits, in accordance with sec. 8.3 of ISO 9001:2008. Another very important stage of grading the compliance of the functioning system with the requirements specified in the documentation is conducting internal audits of the management system. It is necessary to determine supervision as well as to define the individual stages of conducting internal audits by creating an annual programme of internal audits as well as its subsequent conduct and documentation of the resulting observations, findings and conclusions. The results of the audits and their analysis form the basis for a proper assessment of the effectiveness of the implemented system.

[3] J. Vom Brocke, T. Schmiedel, J. Recker, P. Trkman, W. Mertens, S. Viaene, Ten principles of good business process management, „Business Process Management Journal" 2014; 20(4): 2-7.

A non-conforming product or service, in accordance with sec. 8.3 of ISO 9001:2008. Each organisation, in order to ensure the highest possible level of quality of the products or services it offers, in the case of detecting a non-conformity of a product or service, i.e. non-fulfilment of requirements (i.e. defects, faults, shortcomings or other factors influencing the level of customer satisfaction) should ensure ongoing monitoring of each stage of the product or service implementation. Continuous monitoring is aimed at the rapid identification of non-conformities, their proper identification, marking and supervision in order to isolate them from inappropriate use, as well as the rapid elimination of non-conformities. Once a non-conformity has been identified, the employee responsible for the non-conformity (the employee controlling the area in which the non-conformity occurred) is required to ensure that the causes of the non-conformity are eliminated and the potential causes of the non-conformity are evaluated in terms of their significance and likelihood of occurrence.

Corrective and preventive actions taken in relation to the detected nonconformities, in accordance with sec. 8.5.2 and 8.5.3 of ISO 9001:2008. After finding the occurrence of a nonconformity (failure to fulfil the requirement) either during the audit or in the course of ongoing work, the management standards prescribe taking corrective actions with respect to it in order to prevent its recurrence. Each employee has the right to report the occurrence of nonconformity or potential nonconformity by indicating and describing the area (process) in which it occurred, giving the circumstances, place and evidence. In a further stage of processing the reported nonconformity, the persons responsible for the occurrence of the nonconformity analyse it, giving the reasons for its occurrence and proposing actions to eliminate it completely.

The concept and essence of the process

The process approach is based on the assumption that activities should be optimized taking into account processes, not functions, therefore the process is a natural determinant of achieving an increase in the efficiency of a modern organization. Streamlining operations based on the analysis of processes allows for the dynamization of the organizational system. The systemic mechanism of the organization's functioning makes its members aware that it is a specific ecosystem of elements with a complex system of interdependencies. Interference with even one element of the system can destroy the logic of its functioning and threaten the existence of the whole. The basic principle that is used to build the configuration of team activities is their division into elements so that they become understandable and can be quickly mastered by a human. Such a category is a process, treated as a dynamic object around which a system of intra-organizational relations is built[4].

[4] Compare: M. Trocki, B. Grucza, K. Ogonek, Zarządzanie projektami, PWE, Warszawa 2003; M. Trocki, Organizacja projektowa, PWE, Warszawa 2014.

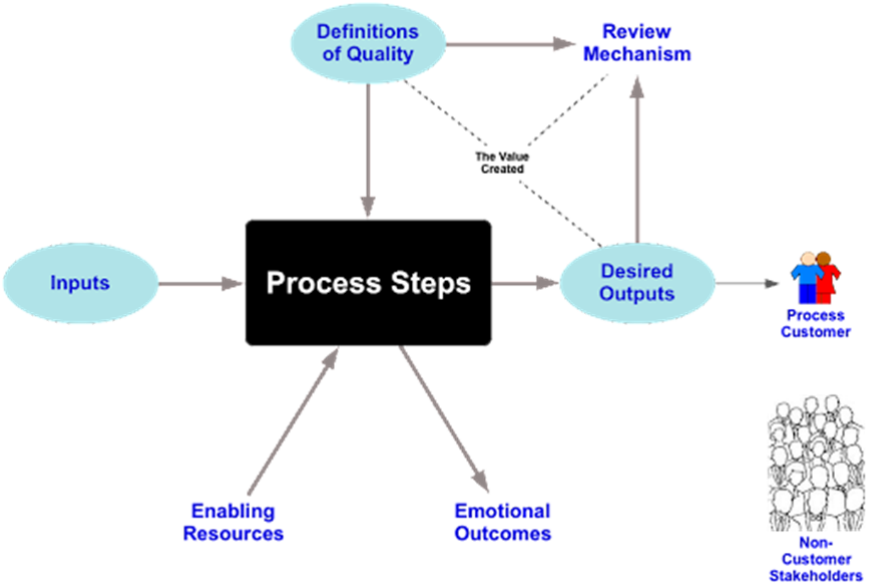


Figure 1. Proces management
Source: http://www.i4process.com/2335/the-first-look-at-a-process-definition/

Each activity or set of activities can be presented as a process, as a result of which from a certain initial value, i.e. input, we obtain a result, i.e. input transformed and enriched with added value, which is the result of the process.

Figure 2. BPM scheme
Source: https://pyrus.com/en/blog/business-process-management

A process-oriented organization can be considered when[5]:
- processes have been identified, the number of which should not exceed several dozen,
- process connection maps have been built,
- there is a system for measuring the results of processes,
- the process of process management is carried out, aimed at their permanent improvement.

Features of the process organization:
- internal implementation of the principles of mutual relations in the client-supplier system, which in practice entitles the members of the process organization to negotiate between themselves the conditions of implementation and reception of the effects of work of business partners;
- team nature of work performed in the process organization, which means broadening its subjectivity;
- designing the course of operations in processes adapted to the contract in order to obtain the maximum effect of adapting the process organization to the complex level of meeting customer expectations;
- empowering implementers to make the necessary decisions and actions in the performance of operations in processes, which allows the client to be brought closer to the contractor, the creator of the added value of the product or service;
- configuration of the organizational structure, taking into account the pro-customer orientation of intra-organizational relations.

The orientation of management systems towards processes was created as a response to the common, static view of the logic of the organization's functioning. The division of the internal organizational structure into independent divisions, units and positions makes it easier to assign them tasks, competences and responsibilities. The functional division of tasks may facilitate planning and control, it generates a system in which they usually have narrow work scopes. It is also easy to allocate the costs of the activities conducted to separate units on the basis of the cost centers, and not the efforts related to the production of products and / or services. The problems faced by modern companies relate to processes, not tasks. The client is not interested in what tasks the supplier or contractor performs, but what is the effect of his actions, i.e. the value he receives as a result of the process.

Complementing the understanding of the process category is the formulation of the term "task". The concept of a process unequivocally excludes tasks performed by individual employees. Examples of such individual activities include a secretary rewriting letters, an accounting officer inserting invoices into envelopes, or a worker at the assembly line putting wheels on vehicles. All these employees perform tasks that are part of the processes. The definition of "process" emphasizes the fact that

[5] See more: E. Skrzypek, M. Hofman, Zarządzanie procesami w przedsiębiorstwie. Identyfikowanie, pomiar, usprawnianie, Wolters Kluwer Business, Warszawa 2010.

a process is not what people do – its essence is a series of actions or tasks performed that lead to the creation of a specific product[6].

There are the following reasons why companies decide to reorient their company's vision towards process solutions:

- The tasks performed do not relate to the company's value;
- In most companies, no one manages the processes and no one is responsible for them;
- There is a significant level of bureaucracy in companies (e.g. a complicated workflow or description of tasks), which makes it difficult to operate efficiently;
- Many different procedures and instructions are created in companies, which means that knowledge about functioning is dispersed;
- Nobody can coordinate one whole process, there are many people involved in the processes, but it is not the work of one functional department;
- Fragmented processes and specialized structures are usually not flexible enough for companies to react to significant external changes;
- Lack of control of the effectiveness of processes (costs, quality, time).

Process management is an activity consisting in the optimization of the structure of the elements of the organization, due to their influence on directing the value of the final effect of the separated processes. It is therefore an attempt to maximize the share of value-adding elements in this structure and to minimize the share of ineffective operations. In practice, this means looking for such an operation structure, i.e. process components, which would be maximally focused on creating added value for the entire organizational system, and thus its individual parts.

Process management concept development

Research on the concept of process management dates back to the mid-1980s. The results of these studies date back to the beginning of the 1990s. It was then that reengineering appeared – Business Process Reengineering (BPR) as one of the restructuring methods. Reengineering is the most radical method, as it is usually rapid, and its implementation sometimes involves a complete abandonment of the current form of organization of specific processes in the enterprise and their construction from the beginning. The authors of the reengineering concept are Michael Hammer and James Champy, who investigated the causes of the malfunctioning of American enterprises and their liquidations. According to the authors of the Business Process Reengineering concept, the vast majority of American enterprises of the 1980s were not creatures operating in an effective manner. In terms of Hammer and Champy,

[6] See more: M. Romanowska, M. Trocki, Podejście procesowe w zarządzaniu, SGH, Warszawa 2004; G. A. Rummler, A. P. Brache, Improving Performance: How to Manage the White Space on the Organization Chart, John Wileys & Sons, San Francisco 2013; M. Segatto, S. I. Dallavalle de Padua, D. P. Martinelli, Business process management: a systemic approach?, „Business Process Management Journal" 2013; 19(4).

such efficiency is mainly expressed in the company's flexibility in relation to the dynamically changing environment, energy, quick response to all changes, competitiveness, innovation, customer orientation and ultimately in profitability. The vast majority of American companies observed by Hammer and Champy did not follow the above pattern. They were characterized by: unhealthy economic condition, stiffness, uncompetitive nature, unproductive character, ineptitude and disrespectful attitude towards the client. The factor responsible for this bad state of affairs was the way in which tasks were performed in the enterprise[7].

The sources of problems in the enterprise vary, and the most common of them include:

- Inability to quickly execute customer orders by the manufacturer – this goal is unattainable due to the existence of ineffective, extensive, multi-stage distribution systems.
- The problem of the efficiency of a specific department and the efficiency of the entire enterprise – the improvement of a specific activity or department often leads to a reduction in the efficiency of the entire enterprise.
- The problem of collective work requiring the coordination of work of many departments of the enterprise.
- Lack of people managing work of key importance for the company – in the modern company model, specialization applies, i.e. the division of the process into the simplest tasks, which is associated with the division of responsibility for the performance of its individual parts. In this case, however, there is no person responsible for the entire performance of the task.
- Increase in the importance of customers – nowadays it is not the manufacturer who decides which product to offer to customers and at what price. It is the customer who dictates the price and properties of the product, and if they do not suit him, he is ready to buy the competitor's product.
- Increased importance of competition – it acquires a global character through the elimination of trade barriers.
- Change becomes a permanent feature – enterprises operating according to the old rules should adapt to the new conditions of the environment in order to be able to compete in it effectively and efficiently and achieve their goals.

Innovative company is a company that implemented an innovation during the period in question. Such a broad definition of an innovative company will not always meet the needs of public policy or research activities. In many cases, a narrower definition can be useful, particularly useful when comparing innovation across sectors, company size categories or across countries. An example of a narrower definition is the one that refers to companies that innovate in products or processes. A company that makes process innovations (process innovative companies) is a company that

[7] See more: T. Pokusa, Proces i zarządzanie procesowe w łańcuchu dostaw [in:] Podejście procesowe w zarządzaniu, M. Romanowska, M. Trocki (ed.), SGH, Warszawa 2015; M. J. Radło, Kontrakty outsourcingowe, [in:] Duening, Business Process Outsourcing. The Competitive Advantage, T. Click (ed.), John Wiley & Sons, Hoboken 2009.

implemented a new or significantly improved product or process during the period in question. This definition, which includes all companies that have implemented a product or process innovation, is similar to the definition of "TPP innovative company". A simple diagram shows the way from the resource of knowledge to the market product and value for the company and the customer.

Figure 3. The path from knowledge to product and value for the company and the customer

Source: https://www.iccs-bpo.com/BPO/Developing-Your-Customer-Core-Values

The figure shows in a simplified way the full course of the process of creating and implementing innovations, which in the conditions of a market economy should be successful for all participants of the process, in the form of value for the company and the customer. Thus, the process of commercialization of scientific research results is accompanied by a chain of creating value for the client, e.g. in a university and a company[8].

[8] Compare: A. J. McNeil, R. Frey, P. Embrechts, Quantitative risk management, concepts, techniques and tools. Princeton University Press, New Jersey 2015; P. Miller, Systemowe zarządzanie jakością, Difin, Warszawa 2011; M. Nowak, Analiza kosztów jako niezbędny etap podjęcia decyzji o outsourcingu, IIR, Warszawa 1999; S. Nowosielski, Podejście procesowe w organizacjach, Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu, Wrocław 2009; M. Ossowski, Identyfikacja i klasyfikacja procesów w przedsiębiorstwie, „Zarządzanie i Finanse" 2012; 4.

Conclusions

A modern enterprise should be innovative, open to novelties, able to search for signals from the market and ready to introduce innovative changes. It is inextricably linked with developing one's innovativeness through professional and competent management and creating such working conditions that will be interesting and attractive for people. With the emergence of innovation, the competitiveness of the enterprise grows, so it can be concluded that it is one of its features, characterized by: searching for, creating and implementing various types of innovations, the ability to make decisions in the event of risk or uncertainty, the ability to constantly observe the market, signals and quick reaction to market needs, the ability to observe and predict the actions of the competition, or to overcome innovative inertia. An innovative enterprise is one that can create, acquire and absorb innovations and obtain information about innovative solutions. The innovativeness of an enterprise is the introduction of a new solution in the field of organization and management, technology or marketing. You can also define the innovativeness of the enterprise as the improvement and development of operational and production technologies related to services, the sphere of organization and management, as well as the collection, processing and sharing of information[9].

Innovative enterprise according to the OECD methodology it is an economic entity that has implemented at least one innovation (product or process) in a specific, usually three-year period of time, also provided that it is new to it. An innovative enterprise is defined as an intelligent organization that continuously generates innovations and implements innovative projects to produce products and services that are appreciated by recipients due to the high level of modernity and competitiveness. It can be said that the concept of innovation defines the results of an enterprise's innovative activity at a given time and in a given place.

Another definition: an innovative enterprise is one that:

- conducts development works and research in a vast area or buys projects of new products / technologies, allocating relatively large financial outlays for this purpose,
- systematically implements new scientific and technical solutions and constantly and continuously introduces innovations to the market,
- it has a significant share of new products in the total number of products or services.

Innovative enterprises are most often called[10]:

- innovators, i.e. individuals that are the first to adapt new ideas and regularly introduce innovations,

[9] S. Gopalakrishnan, Unraveling the Links Between Dimensions of Innovation and Organizational Performance, „The Journal of High Technology Management Research" 2000; 11(1): 137-153.

[10] See: Z. Malara, Przedsiębiorstwo w globalnej gospodarce, wyzwania współczesności, PWN, Warszawa 2007; J. Machaczka, Zarządzanie rozwojem organizacji, czynniki, modele, strategia, diagnoza, PWN, Warszawa 1998.

- early adapters, more careful in their actions than innovators, but characterized by a high propensity to introduce innovations,
- late majority – they adapt innovations with a long delay, usually under the influence of economic calculations or market pressure,
- slackers, i.e. organizational units that introduce innovations at the latest among units of a given type of activity.

The enterprise itself should develop the form and pattern of innovative behavior, both internal and in contacts with the environment. The most important attributes of an innovative enterprise are:

- ability to generate innovation,
- creativity,
- the ability to use the innovative potential to maintain a competitive position,
- high competences,
- the ability to predict changes in the environment,
- the ability to recognize customer needs and meet them,
- having a team of innovators,
- flexibility and the ability to adapt to a changing and turbulent environment.

A company that is innovatively active in the area of processes – is a company that conducted innovative activities in the period in question, including both ongoing and discontinued activities. In other words, innovation-active companies are companies that carried out innovative activities during the period in question, regardless of whether their activity led to the implementation of innovation or not. New firms may emerge during the survey period, whether entirely from scratch or through mergers, divisions or other types of reorganization. The innovativeness of these companies (innovative company or innovation active company) is defined in the same way as for all other companies.

Assessment of the degree of innovation of the company. It can be defined in several ways. The basic definition of an innovative company is that it is a company that has implemented at least one innovation, while a product or process innovator is defined as a company that has implemented a product or process innovation. Other ways of classifying innovative companies are also possible, depending on public policy and research needs. Such classifications can be used to determine what percentage of firms (by size class, sector, country or other factor) implement each of the four types of innovation, or implement a combination of several types of innovation (for example, product and marketing innovations, or process innovations with organizational innovations). Classification according to the criterion of innovation may also take into account other information (for example, data on the entity that is the innovation creator) that can be used to identify companies that only absorb innovations in products and processes developed in other companies. It may happen that during the period in question, companies will conduct innovative activities, but will not actually implement innovations. All activities related to the development or

implementation of innovations, including implementations planned for the future, are classified as innovative activities[11].

Bibliography

Bugdol M., Szczepańska K., Podstawy zarządzania procesami, Difin, Warszawa 2016.

Czekaj J., Zarządzanie procesami biznesowymi. Aspekt metodyczny, Wydawnictwo Uniwersytetu Ekonomicznego w Krakowie, Kraków 2009.

Grajewski P., Procesowe zarządzanie organizacją, PWE, Warszawa 2012.

Grajewski P., Organizacja procesowa. Projektowanie i konfiguracja, PWE, Warszawa 2007.

Gopalakrishnan S., Unraveling the Links Between Dimensions of Innovation and Organizational Performance, „The Journal of High Technology Management Research" 2000; 11(1): 137-153.

Harington H.J., Process Management Excellence: The Art of Excelling in Process Management, Paton Press LLC, California 2006.

Kohlbacher M., Reijers H.A., The effects of process – oriented organizational design on firm performance, „Business Process Management Journal" 2013; 19(2).

Landwójtowicz-Kucińska A., Podejście procesowe w zarządzaniu innowacjami [in:] Innowacje w zarządzaniu i inżynierii produkcji, R. Knosala (ed.), Oficyna Wydawnicza PTZP, Opole 2013.

Malara Z., Przedsiębiorstwo w globalnej gospodarce, wyzwania współczesności, PWN, Warszawa 2007.

Machaczka J., Zarządzanie rozwojem organizacji, czynniki, modele, strategia, diagnoza, PWN, Warszawa 1998.

McNeil A.J., Frey R., Embrechts P., Quantitative risk management, concepts, techniques and tools, Princeton University Press, New Jersey 2015.

Miller P., Systemowe zarządzanie jakością, Difin, Warszawa 2011.

[11] Comparte: M. Bugdol, K. Szczepańska, Podstawy zarządzania procesami, Difin, Warszawa 2016; J. Czekaj, Zarządzanie procesami biznesowymi. Aspekt metodyczny, Wydawnictwo Uniwersytetu Ekonomicznego w Krakowie, Kraków 2009; P. Grajewski, Procesowe zarządzanie organizacją, PWE, Warszawa 2012; P. Grajewski, Organizacja procesowa. Projektowanie i konfiguracja, PWE, Warszawa 2007; H. J. Harington, Process Management Excellence: The Art of Excelling in Process Management, Paton Press LLC, California 2006; M. Kohlbacher, H. A. Reijers, The effects of process – oriented organizational design on firm performance, „Business Process Management Journal" 2013; 19(2); A. Landwójtowicz-Kucińska, Podejście procesowe w zarządzaniu innowacjami [in:] R. Knosala (ed.), Innowacje w zarządzaniu i inżynierii produkcji, Oficyna Wydawnicza PTZP, Opole 2013.

Nowak M., Analiza kosztów jako niezbędny etap podjęcia decyzji o outsourcingu, Wydawnictwo IIR, Warszawa 1999.

Nowosielski S., Podejście procesowe w organizacjach, Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu, Wrocław 2009.

Ossowski M., Identyfikacja i klasyfikacja procesów w przedsiębiorstwie, „Zarządzanie i Finanse" 2012; 4.

Pokusa T., Proces i zarządzanie procesowe w łańcuchu dostaw [in:] Podejście procesowe w zarządzaniu, Romanowska M., Trocki M. (ed.), SGH, Warszawa 2015.

Radło M. J., Kontrakty outsourcingowe, [in:] Duening, Business Process Outsourcing. The Competitive Advantage, Click T. (ed.), John Wiley & Sons, Hoboken 2009.

Romanowska M., Trocki M., Podejście procesowe w zarządzaniu, SGH, Warszawa 2004.

Rummler G.A, Brache A.P., Improving Performance: How to Manage the White Space on the Organization Chart, John Wileys & Sons, San Francisco 2013.

Segatto M., Dallavalle de Padua S.I., Martinelli D.P., Business process management: a systemic approach?, „Business Process Management Journal" 2013; 19(4).

Skrzypek E., Hofman M., Zarządzanie procesami w przedsiębiorstwie. Identyfikowanie, pomiar, usprawnianie, Wolters Kluwer Business, Warszawa 2010.

Trocki M., Grucza B., Ogonek K., Zarządzanie projektami, PWE, Warszawa 2003.

Trocki M., Organizacja projektowa, PWE, Warszawa 2014.

Vom Brocke J., Schmiedel T., Recker J., Trkman P., Mertens W., Viaene S., Ten principles of good business process management, „Business Process Management Journal" 2014; 20(4): 2-7.

Wysocki R., Efektywne zarządzanie projektami / Tradycyjne, zwinne, ekstremalne, HELION, Gliwice 2013.

Zairi M., Sinclair D., Business process re-engineering and process management, „Business Process Re-engineering & Management Journal" 1995; 1(1): 7-8.

*Chukwunonso Etal**
*Andrzej Gwiżdż***
*Diana Ismailova****
*Emanuel Józefacki*****
*Magdalena Gawrońska******

THE PROCESSES INNOVATION MODEL

Model procesowy innowacji

*Dr., Chukwuemeka Odumegwu Ojukwu University in Nigeria, ORCID: 0000-0002-1211-0683
**Dr., School of Business – National-Louis University in Nowy Sącz (WSB-NLU), ORCID: 0000-0001-5551-973X
***Prof., Kokshe Academy in Kazachstan, ORCID: 0000-0002-8391-5796, ORCID: 0000-0003-2471-3024
****WSEI University in Lublin, ORCID: 0000-0003-0078-6353
*****WSEI University in Lublin, student

Streszczenie

Dla właściwego rozwoju przedsiębiorstwa bardzo ważne jest opracowanie strategii promowania innowacji, bowiem ich brak staje się najczęstszą przyczyną spadku konkurencyjności. Zdolność tworzenia i właściwego wykorzystania innowacji stanowi ważny element określający sprawność funkcjonowania jednostki gospodarczej oraz możliwość jej dalszego rozwoju na konkurencyjnym rynku. Celem zarządzania rozwojem przedsiębiorstwa powinno być kształtowanie postępu techniczno-organizacyjnego oraz ekonomicznego, a innowacje organizacyjne odnoszące się do sfery zarządzania wraz z innowacjami produktowymi należą do najważniejszych czynników kształtujących konkurencyjność przedsiębiorstw, w tym małych i średnich jednostek gospodarczych.

Słowa kluczowe: *zarządzanie procesowe, zarządzanie innowacjami, komercjalizacja badań, zarządzanie funkcjonalne, racjonalność ekonomiczna, optymalizacja działań*

Summary

For the proper development of an enterprise, it is very important to develop a strategy to promote innovation, as its absence becomes the most common cause of a decline in competitiveness. The ability to create and make proper use of innovations is an important element determining the efficiency of an economic entity and the possibility of its further development in a competitive market. The aim of business development management should be to shape technical, organisational and

economic progress, and organisational innovations relating to the sphere of management, together with product innovations, are among the most important factors shaping the competitiveness of enterprises, including small and medium-sized economic units.

Key words: process management, innovation management, commercialisation of research, functional management, economic rationality, optimisation of operations

Introduction

Management innovation is an approach that allows companies to respond dynamically and flexibly to changing market conditions. Here are some examples of innovations that are revolutionising the way we manage companies. Information technology: the use of modern information systems, such as enterprise resource management (ERP) software, enables effective monitoring, planning and control of all activities in a company. This allows processes to be optimised, errors to be eliminated and decisions to be made more quickly. Lean methodology, or a focus on eliminating waste and improving operational efficiency. By identifying and eliminating unnecessary activities, Lean enables higher quality, faster turnaround times and lower production costs. Agile Management: is an approach that focuses on flexible adaptation to change and continuous improvement. By dividing projects into short iterations, Agile Management enables rapid response to changing customer and market requirements. The process model of innovation creates a set of processes, and from the point of view of the company, the following processes can be called conventionally:

Ideas => R + D => Transfer => Implementation =>
Commercialization => Diffusion

What is important:

- these are not phases (stages) of the innovative process, but rather processes that make up contemporary innovative activity;
- this sequence of steps is not always the case. For example, in the course of research, an idea for a new product may come up, even accidentally, that has not been considered before;
- some processes, such as "Ideas" and "R&D", may run in parallel;
- the innovation may or may not be based on an invention that arose during research and development;
- implementation and commercialization are part of the aforementioned process of transforming research results into practical applications;
- activities that make up the transfer of technology (knowledge) and diffusion of innovation are not typical work included in the innovation process, but accompanying it;

- in the case of a specific innovation process, not all phases have to occur, some may not occur at all;
- the only process that must take place is implementation, because it is the implementation that determines whether (technical) innovation will emerge or not.

Nowadays, innovation is one of the key factors influencing the company's competitiveness for a company, therefore it can be said that it is one of the conditions determining its survival and development. It requires not only the so-called instrumental rationality[1], i.e. the assessment and analysis of changes implemented in the enterprise, but also the so-called strategic prudence[2] that is, developing entrepreneurial activities, increasing the ability to undertake challenges or solving problems, as well as taking up new market challenges that will bring positive results in the future. Enterprises can become innovative, both as a result of making groundbreaking discoveries and inventions, but also as a result of minor improvements, modifications or corrections. While the first road is difficult, complicated and rarely happens, the second is very often "within reach" of enterprises, you just need to be able to use it. Therefore, innovation should become the basic way of existence and functioning of the company, the value and opportunities of which all employees know. It should also be for him the main force of originality, creativity and creativity[3].

Stages of the innovation design management cycle

It is a systemic process – the significance of the element of chance is definitely diminishing in this issue or it does not exist. The selection of methods, techniques and used in this complex process should be consistent with the design cycle of innovative products and processes in the enterprise. System-based innovation design management cycle in an enterprise – can be included in several activities that can be presented in five stages, carried out concurrently (the first two) and sequentially (the remaining) – each of them requires special tools (figure 1).

[1] J. Penc, Innovations and changes in the company. Transformation and control of the company's development. Principles of operation. Conditions for Success, Placet, Warsaw 1999, p. 13.

[2] Quote from: M. Bratnicki: Enterprise Transformation, Wyd. AE in Katowice, Katowice 1998, p. 88.

[3] Source: A.H. Jasiński, Innovativeness in the Polish economy Models, barriers, support instruments, University of Warsaw, Warsaw 2014, p. 24-25.

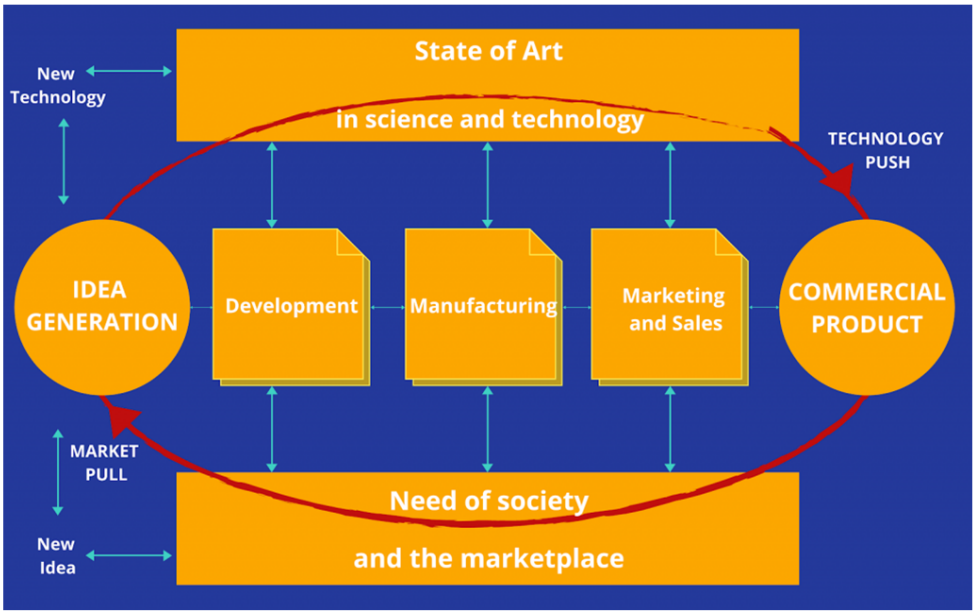


Figure 1. The management cycle for designing innovative processes
Source: https://alcorfund.com/insight/innovation-models-innovation-process-models-examples/

The stages of the cycle's operation that require constant attention and analysis of the company's environment are:
- Searching for signals about potential threats and opportunities.
- Strategic analysis, selection and planning.
- Acquiring technology.
- Implementation.
- Reviewing and learning.

From the point of view of economic theory, innovation currently plays an extremely important role in organizing economic growth. They are also gaining more and more importance as a subject of scientific research. In addition, they are also an important object in practical activities, the aim of which is to start a more extensive use of innovations in the implementation of specific goals relevant to modern man and related to his activities. The significant increase in the importance of innovations and the increase in the frequency of their application, which can be observed in recent years, are primarily the result of the continuous expansion of knowledge about the structure of innovative processes. To a large extent, they also result from the well-founded belief that innovation has a very strong impact on the entire economic and social development. Assuming the degree of complexity of the innovation proces.

Understood in this sense, the innovative process is composed of various stages of technological changes, which include:
- Invention, that is, a specific idea;
- Innovation, that is, a specific invention;
- Diffusion, i.e. the way of impact (dissemination).

Time is the most important factor for the entire course of the innovation process. It takes into account both the moment of the appearance of a given innovation and the duration of the entire process, i.e. all its stages: from the moment when a given idea comes into existence to the moment when it takes the form of a given product,servicesor technology. Each innovation has a so-called life cycle, i.e. its specific duration[4,5,6].

Life cycle of process innovations

It is initiated when the research work begins and then continues through the basic research phase and the implementation research phase until the implementation of the innovation begins, which is the beginning of the life cycle of a product, service or technology on the market. Conducting the observation and analysis of innovation processes has contributed to the distinction of certain specific regularities:

- The innovation life cycle is individual. It depends on various factors.
- The most important of which are: the level of economic development, as well as the location of innovation, i.e. a specific area in which the innovation process takes place.
- The innovations that are emerging today are much more often the result of activities undertaken as part of teamwork.
- In some cases, it is not possible to appoint one separate author of a given Innovation.
- Along with the evolution of civilization towards development and progress, the innovative process of a given product, service or technology is shortened. The formation of the so-called next generations of products.

Methodology for implementing process management

Methodology for implementing process management should be based on the following principles:

1. start with formulating a strategy,
2. focus on processes,
3. link the strategy with processes,
4. analyze the level of customer satisfaction,
5. integrate the processes and their course with IT systems.

---

[4] P. Grajewski, Premises of the process approach to organization design and management, „Research Papers of the Wroclaw University of Economics" 2014; 340: 275-282.

[5] M. Hammer, J. Champy, Reengineering in Corporation. A Manifesto for Business Revolution, „Harper Business" 1993; 7.

[6] B. Kalinowski, The impact of process maturity on the effectiveness of the organization, „Marketing i Rynek" 2015; 5.

The effectiveness of introducing the methodology of process management into business practice is determined by the application of the following principles[7,8,9,10,11,12]:

1. pervasiveness, which means the need to understand and implement the principles and assumptions of process management throughout the organization;
2. ownership, which means that all processes should have a clearly defined owner who manages the process team and is responsible for the review of the continuous improvement of the process;
3. documentation, which means the need to define document standards (i.e. internal measures of processes, ways of document circulation and information flow) that should meet the expectations of process participants. All elements of the methodology should be described in a complete, detailed and unambiguous manner in the form of the so-called the Process Handbook Manual, which is the equivalent of organizational regulations in structured management, consisting of the following parts:
   - methodological foundations of process management – concepts and general principles,
   - organization of work related to process management,
   - process design,
   - process implementation,
   - supervision over the implementation of the process,
   - recommended methods and techniques of process management;
4. measurement, which means the need to evaluate the process using measures classified into the categories of quality, cost and time;
5. inspection, which means making the process owner responsible for monitoring activities, identifying gaps in the implementation of the process and eliminating them.

Process design

Process design it is a particularly difficult undertaking in organizations, especially when it is done for the first time. It is also related to the need to redefine the picture of the company's operation. Identification of processes carried out according to the adopted criteria, in fact, makes members of the organization aware of the new division of the enterprise into areas whose boundaries are determined by the inputs and outputs of processes, and not, as before, the boundaries between sets of tasks and

[7] J. N. Kapferer, The new strategic brand management advanced insights and strategic thinking, fifth edition, Kogan, London 2012.

[8] M. Kunasz, Practical aspects of process management, Economicus, Szczecin 2010.

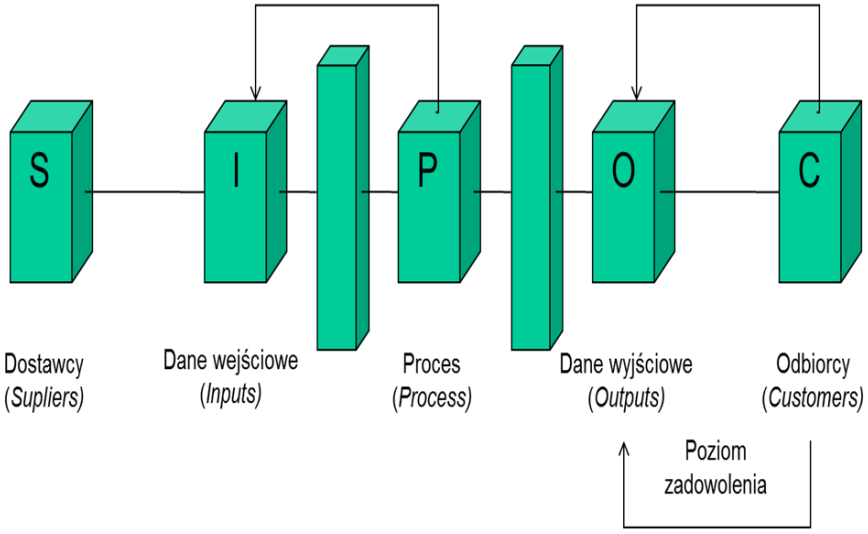
[9] Z. Malara, An enterprise in the global economy, contemporary challenges, PWN, Warszawa 2007.

[10] J. Machaczek, Organization development management, factors, models, strategy, diagnosis, PWN, Warszawa 1998.

[11] A. J. McNeil, R. Frey, P. Embrechts, Quantitative risk management, concepts, techniques and tools, Princeton University Press, New Jersey 2015.

[12] M. Nadolna, A. Skowronek-Mielczarek, Process management and modern media enterprises, CeDeWu, Warszawa 2014.

functions. Designing the internal structure of the process, i.e. the set of activities it consists of, requires a specific transformation of the functions and tasks performed into sequential sets of operations (activities), linked with each other by a chain of sequence. It would be good if the process designer would arrange the next elements of the action preferably from the end, i.e. from the effect expected by the recipient (client). In designing processes according to the SIPOC model (Supliers, Inputs, Process, Outputs, Customers), it is assumed that the project of the organization's operation is fully in line with the expectations of the recipients.



Source: own study

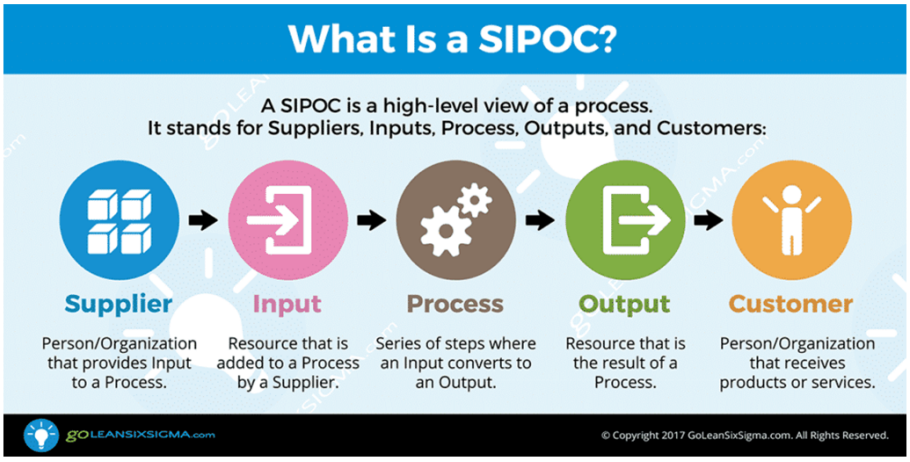


Figure 2 and 3. Designing an organization towards processes – the SIPOC model / SIPOC model (concept)

Source: https://goleansixsigma.com/sipoc/

An important factor for the effective process design effect is the precise definition of the needs and expectations of recipients. These expectations determine the effect of the process and its course, and their change means each time the need to reconfigure the internal process structure and the potential of the necessary supplies. As the processes form a network of interrelated contractors, a change in the configuration of one process, influenced by new customer expectations, may affect the course of other, closely related processes.

Functional management and process management

Changes towards procedural organization require a radical reconstruction of the methods of operation of the existing functional organization. The key problem is to design processes and rebuild all aspects of the new organization around them.

In such a targeted reorganization process, it is therefore necessary to change[13,14,15,16]:

- the structure of the basic elements of the organization – functional cells are replaced by process implementation teams whose internal configuration depends on the type of work performed. These can be, for example: case teams – implementation of a homogeneous process; contract teams – individual performance of a contract (transaction) with possible support from experts (advisers);
- the nature of the work performed, from simple to multidimensional – the process organization has an impact on shifting and overlapping boundaries between different types of work, thus replacing individual responsibility for the implementation of tasks with joint responsibility for the achieved results of the process. Changing the formula of coordinating the existing, divided process leads to the gradual elimination of such works as: agreeing, waiting, checking, signing, tracking, etc., strengthening the actual, substantive operational content of the activity;
- structure of the organizational structure – the multi-level hierarchical system is gradually eliminated, the main task of which is to maintain the efficiency of the mechanisms of control, monitoring, settling inter-functional conflicts in the fight for priorities and gratuities, and making decisions that bind the parts together. Instead, a flat structure is created, composed of independent teams fully responsible for the manner and effects of activities, supported by managers who change the current role of supervisors to the role of advisers. Processes are controlled by the implementers themselves. The procedures are determined by an ongoing

[13] R. Škrinjar, P. Trkman, Increasing process orientation with business process management: Critical practices, „International Journal of Information Management" 2013; 33.

[14] M. Kohlbacher, H. A. Reijers, The effects of process - oriented organizational design on firm performance, „Business Process Management Journal" 2013; 19(2).

[15] M. Zairi, D. Sinclair, Business process re-engineering and process management, „Business Process Re-engineering & Management Journal" 1995; 1(1).

[16] M. Kohlbacher, The effects of process orientation: a literature review, „Business Process Management Journal" 2010; 16(1).

assessment of the situation and conditions as perceived by the process implementation team. The reaction is quick and requires no interference from hierarchical levels. Traditional organizational structure is losing importance, because it is replaced by teams and people who contact who they want, easily reach the information they need, and make decisions on their own. The structure diagram is no longer the basic information about the organization – it is replaced by a map of processes and organizational roles;

- way to measure results – from work-based to productive. Traditional job evaluation determines only the potential factors of the final effect, not the effect itself. Process management requires the evaluation of the result of the team's activity from the point of view of its value for the client (internal and external). Therefore, not the value of a function is measured, but the value of operations and entire processes. This value is measurable when teams create products and / or provide services with an overall effect for which the customer is willing to pay a certain price;
- employee status – ubiquitous, formalized organizational control is replaced by a wide range of competences of process implementers. In a traditional functional organization, an employee is expected to be active and inventive within the scope defined by formal regulations and procedures. In the process organization, the rule is to independently create implementation procedures within the framework of predefined processes. The adoption of this principle reverses the roles played by an employee in both types of organization: from a contractor moving around the area of independence defined by regulations, he becomes an active executor, capable of unconventional activities determined by the size of the process for which he is responsible and which he shapes. In this situation, the key factor of effective operation in such an organization is the increased scope of competences, and consequently – greater responsibility. The manager-subordinate relationship with the system of headship and subordination in a functional organization changes into a relationship of cooperation and support. The status of a specialist - implementer (with a wide range of skills and abilities) is increasing, for whom promotion does not have to mean vertical movements;
- organizational culture – the cult of the superior is replaced by the cult of the client. The transformation of the organization in the process direction triggers a change in the main values adopted in the employee team. The way of reading the organizational hierarchy changes, and thus interpersonal relations are no longer determined by the principle of the hierarchy of reasons. Discussion, negotiation, mutual persuasion and argumentation begin to prevail over the decreed reason as a derivative of the place in the hierarchy. The importance of such attitudes as real creativity and innovation, courage, openness and empathy in relations with clients, direct communication is growing.

In addition to the described main parameters of the organization's transition towards the process structure, the following are also changing: interpersonal relations, promotion paths, employee evaluation systems, remuneration principles, roles of managers and managers. The parameters that a process organization should have are

characteristic of a modern enterprise that develops well in all spheres. Reaching such a level is not easy and requires many efforts on the part of all members of the organization, especially managers. Table 1 compares functional organization with process organization, and table 2 presents differences between functional management and process management.

Table 1. Comparison of functional organization with process organization

Parameters changes	**Organization functional**	**Organization trial**
Work	Straight	Complex
Environment	Control	Independence
Structure	Hierarchical	Flat
Unit	Department	Team
Staff	Employees And Managers	Specialists
Center Of Gravity	Boss	Client
Axis	Function	Process
Measurement	Activity	Result
Career	Promotion	Development
Remuneration	Position	Value
Manager	Supervisor	Coach
Manager	Supervising Person	Leader
Objectives	Separately	Common
Perspective	Narrow	Wide
Values	Protective	Productive

Table 2. Functional management and process management

Characteristic	Management functional	Management process
Organizational structure	- Hierarchical - Functional orientation - Classic organizational structure	- Horizontal - Process orientation - Process architecture
Operational processes	- By function - Functional limits - Discontinuous flows - Non-optimized operations	- According to the processes - End-to-end, customer--oriented flows simplified, optimized in terms of customer service, cost and efficiency
People	- Functional obedience - Limited view of the client, separation of specialists' skills - Individualism	- Process obedience, customer--oriented - Skills integration - Team orientation
Technology	- Discreet in functions - Measures of functional goals - Lost connection of planning and control	- Integrated in processes - The basis of process measures - Planning and process control
Communication	- Vertical orientation	- Horizontal orientation
Culture	- Functional principalities - The language of discipline	- Process owner - Language of service provision

Source: R. Škrinjar, P. Trkman., Increasing process orientation… op. cit.; M. Kohlbacher, H. A. Reijers, The effects of process… op. cit.; M. Zairi, D. Sinclair., Business process re-engineering… op. cit.; M. Kohlbacher, The effects of process… op. cit.; R. G. Lee, B. G. Dale, Business process management: a review and evaluation, „Business Process Management Journal" 1998; 4(3); M. Kunasz, Functional organization vs. process organization research results, „Zarządzanie Przedsiębiorstw" 2013; 4: 7-8; P. Grajewski, Premises of the process… op. cit.; M. Hammer, J. Champy., Reengineering in Corporation… op. cit.; B. Kalinowski, The impact of process… op. cit.; J. N. Kapferer, The new strategic… op. cit.; M. Kunasz, Practical aspects… op. cit.; Z. Malara, An enterprise in the… op. cit.; J. Machaczek, Organization development… op. cit.; A. J. McNeil, R. Frey, P. Embrechts, Quantitative risk… op. cit.; M. Nadolna, A. Skowronek-Mielczarek, Process management… op. cit.

Conclusions

Innovation activity in an enterprise depends in part on the diversity and structure of its linkages with sources of information, knowledge, technology, operating practices and human and financial resources. Linkages act as sources of knowledge and technology for the innovation activity of enterprises, and their form varies from

passive information sources for tangible and intangible knowledge and technology providers to collaborative partnerships. Linkages can relate to any of the four types of innovation (i.e. within products, processes, marketing and organisational methods).

Each linkage (linkage) connects the innovative enterprise with other actors in the innovation system: state laboratories, universities, public policy departments, regulators, competitors, suppliers and customers. In statistical surveys on innovation, information can be obtained on the prevalence and importance of different types of linkages and on the factors influencing the use of specific linkages.

From the point of view of the control of innovation processes in an organisation, the beginning of the innovation process should be taken to be the creation and collection of inventions regardless of where they originate. Subsequent stages include selecting those that are likely to be successful, deciding how to implement them and implementing them, i.e. concrete practical acts that make it possible to introduce innovations into organisational reality. Creative change, which is precisely innovation, also differs from non-creative change in that it proceeds in two basic phases - conceptual (creative) and application.

The end result of the creative phase is a new, creative and appropriately detailed idea, generally referred to as an invention or solution, while in the application (implementation) phase, the invention is used for specific practical (production) purposes, i.e. transformed into an innovation. As a result of this two-phase nature, it is necessary to distinguish between two concepts: innovation, i.e. an invention applied in practice, and invention - a new idea (set of ideas) of any nature in a given system, appropriately specified, not directly resulting from the existing state of affairs and suitable for application.

Bibliography

Bratnicki M., Enterprise Transformation, Wyd. AE in Katowice, Katowice 1998.

Grajewski P., Premises of the process approach to organization design and management, „Research Papers of the Wroclaw University of Economics" 2014; 340: 275-282.

Hammer M., Champy J., Reengineering in Corporation. A Manifesto for Business Revolution, „Harper Business" 1993; 7.

Jasiński A.H., Innovativeness in the Polish economy Models, barriers, support instruments, University of Warsaw, Warsaw 2014.

Kalinowski B., The impact of process maturity on the effectiveness of the organization, „Marketing i Rynek" 2015; 5.

Kapferer J.N., The new strategic brand management advanced insights and strategic thinking, fifth edition, Kogan, London 2015.

Kohlbacher M., Reijers H. A., The effects of process – oriented organizational design on firm performance, „Business Process Management Journal" 2013; 19(2).

Kohlbacher M., The effects of process orientation: a literature review, „Business Process Management Journal" 2010; 16(1).

Kunasz M., Functional organization vs. process organization research results, „Zarządzanie Przedsiębiorstw" 2013; 4: 7-8.

Kunasz M., Practical aspects of process management, Economicus, Szczecin 2010.

Lee R. G., Dale B. G., Business process management: a review and evaluation, „Business Process Management Journal" 1998; 4(3).

Machaczek J., Organization development management, factors, models, strategy, diagnosis, PWN, Warszawa 1998.

Malara Z., An enterprise in the global economy, contemporary challenges, PWN, Warszawa 2007.

McNeil A.J., Frey R., Embrechts P., Quantitative risk management, concepts, techniques and tools, Princeton University Press, New Jersey 2015.

Nadolna M., Skowronek-Mielczarek A., Process management and modern media enterprises, CeDeWu, Warszawa 2014.

Penc J., Innovations and changes in the company. Transformation and control of the company's development. Principles of operation. Conditions for Success, Placet, Warsaw 1999.

Škrinjar R., Trkman P., Increasing process orientation with business process management: Critical practices, „International Journal of Information Management" 2013; 33.

Zairi M., Sinclair D., Business process re-engineering and process management, „Business Process Re-engineering & Management Journal" 1995; 1(1).

https://goleansixsigma.com/sipoc/

https://alcorfund.com/insight/innovation-models-innovation-process-models-examples/

*Sylwia Skrzypek-Ahmed**
*Artem Artyukhov***
*Artur Kornatka****
*Hannatu Umar*****
*Magda Ahmed******

INNOVATION AS A STIMULANT FOR ECONOMIC GROWTH AND ECONOMIC COMPETITIVENESS

Innowacje jako stymulant wzrostu gospodarczego i konkurencyjności ekonomicznej

*PhD., Assoc. Prof., WSEI University in Lublin, ORCID: 0000-0002-1211-0683
**Prof., DsC., PhD., Sumy State University in Ukraine, ORCID: 0000-0003-1112-6891
***MA, School of Business – National-Louis University in Nowy Sącz (WSB-NLU), ORCID: 0000-0001-5033-7785
****PhD., Assoc. Prof., Federal University of Lafia, Nigeria, ORCID: 0009-0004-4926-7934
*****WSEI University in Lublin, student

Streszczenie

Innowacje odgrywają szczególną rolę wśród czynników wpływających na konkurencyjność przedsiębiorstw. Bez względu na rozmiar prowadzonej działalności, efektywne zarządzanie procesami innowacyjnymi stanowi główny element konkurencyjności przedsiębiorstwa. O przewadze konkurencyjnej decyduje bowiem podatność na wdrażanie wszelkich zmian produktowych i technologicznych, zmian w systemie zarządzania, czy w komunikacji z potencjalnym użytkownikiem produktu. Mimo wielu czynników ograniczających wdrażanie innowacji w małych i średnich przedsiębiorstwach ich realizacja jest niezbędna, bowiem pozwala na dalszy rozwój tych firm (często rodzinnych) oraz efektywniejsze dostosowanie do zmian zachodzących w jej otoczeniu, zdobywanie nowych rynków, a tym samym osiągnięcie przewagi konkurencyjnej. Konieczność sprostania coraz to większym wymaganiom odbiorców, rosnącej konkurencji motywuje małe i średnie przedsiębiorstwa do wprowadzania zmian w różnych obszarach ich funkcjonowania. Przedsiębiorstwo, jeśli chce się rozwijać i odnosić sukcesy na rynku, musi doskonalić oferowane wyroby czy świadczone usługi, usprawniać procesy technologiczne oraz polepszać organizację produkcji, a zatem powinno stale poszukiwać i wdrażać rozwiązania innowacyjne.

Słowa kluczowe: *innowacje, zarządzanie innowacjami, proces innowacyjny, efektywność, racjonalność, konkurencyjność*

Summary

Innovation has a special role among the factors influencing the competitiveness of enterprises. Regardless of the size of the business, effective management of innovation processes is a key element of a company's competitiveness. This is because the competitive advantage is determined by the susceptibility to implement any product and technological changes, changes in the management system or in communication with potential product users. In spite of the many factors limiting the implementation of innovations in small and medium-sized enterprises, their implementation is essential, as it allows these (often family-owned) companies to further develop and adapt more effectively to changes in their environment, conquer new markets and thus achieve a competitive advantage. The need to meet the ever-increasing demands of customers and growing competition motivates small and medium-sized enterprises to introduce changes in various areas of their operation. If an enterprise wants to develop and be successful on the market, it must improve the products or services it offers, streamline technological processes and improve the organisation of production, and therefore it should constantly seek and implement innovative solutions.

Key words: innovation, innovation management, innovation process, efficiency, rationality, competitiveness

Introduction

Innovation is an important factor in stimulating the growth of the economy and its international competitiveness. The question then arises how to stimulate innovation, in which sectors and with which instruments / methods? In the economic field, innovation is the development and implementation of new concepts and technologies that improve the quality of products and services or increase production efficiency. An example is information technology, which has changed the way goods and services are produced and sold, while creating new markets and business models. One of the most important effects of innovations is their impact on economic growth. In a nutshell, they can lead to increased productivity, i.e. achieving more output with the same inputs. Numerous innovations have been initiated precisely in Europe and it continues to be an innovative region; we undoubtedly have the potential to further strengthen our innovativeness. According to the World Economic Forum's Global Competitiveness Report, there are only three Eurozone countries in the world's top ten. The gap in the amount of resources devoted to R&D by the euro area and other major developed economies has persisted for some time. On top of this, the diffusion of innovation in the euro area appears to be slow. Recent research by the ECB has shown that there is a large productivity gap between the highest and lowest performing companies in this area. This means that while well-performing, pioneering companies are highly innovative, the so-called "marauders" benefit only marginally from innovation. Structural measures to support innovation include

increasing spending on research and development and investing in education, as well as making it easier for entrepreneurs to set up new companies and more quickly withdraw bankrupt entities from the market. Innovation can also be supported by companies themselves by investing in their employees and conducting their own research and development.

Innovation plays a special role among the factors influencing the competitiveness of enterprises. Regardless of the size of the business, effective management of innovation processes is a key element of a company's competitiveness. This is because the competitive advantage is determined by the susceptibility to implement any product and technological changes, changes in the management system or in communication with potential product users. In spite of the many factors limiting the implementation of innovations in small and medium-sized enterprises, their implementation is essential, as it allows these (often family-owned) companies to further develop and adapt more effectively to changes in their environment, conquer new markets and thus achieve a competitive advantage. The need to meet the ever-increasing demands of customers and growing competition motivates small and medium-sized enterprises to introduce changes in various areas of their operation. If an enterprise wants to develop and be successful on the market, it must improve the products or services it offers, streamline technological processes and improve the organisation of production, and therefore it should constantly seek and implement innovative solutions.

Innovation at the company level

For the successful development of an enterprise, it is very important to develop a strategy to promote innovation, as the lack of innovation becomes the most common reason for a decline in competitiveness. The ability to create and make proper use of innovations is an important element determining the efficiency of an economic entity and the possibility of its further development in a competitive market. The aim of business development management should be to shape technical, organisational and economic progress, and organisational innovations relating to the sphere of management, together with product innovations, are among the most important factors shaping the competitiveness of enterprises, including small and medium-sized economic units[1].

A company's innovativeness can be defined in several ways. The basic definition of an innovative firm is that it is a firm that has implemented at least one innovation, while a product or process innovator is defined as a firm that has implemented a product innovation or a process innovation. All activities related to the development or implementation of an innovation, including implementations planned for the future, are counted as innovative activities. Innovation activity carried out during a given period can be of three types: successful activity, i.e. the successful implementation of the

[1] P. Kokot-Stępień, Zarządzanie innowacjami jako źródło konkurencyjności małych i średnich przedsiębiorstw, „Organizacja i Zarządzanie" 2017; 114: 222-227.

innovation (although there is no requirement that this also be a commercial success); ongoing activity, i.e. activities in progress that have not yet led to the implementation of the innovation; or activity abandoned before the innovation was implemented.

The problematic and increasingly difficult marketing of products is forcing manufacturers to do a lot to keep their regular customers with them. Proper identification of customer needs will create demand for a specific good and allow loyalty to a proven product. The ever-increasing consumer awareness is reflected in the demand for goods distinguished by their original recipe, which is the result of a search for a specific method and a unique composition. The modern consumer is becoming more and more demanding when making food purchasing decisions and, as a result, it is no longer enough just to have the right price and standard quality. A fundamental issue, which is becoming increasingly important for the potential customer, is the selection of products with the right parameters, the most important of which are: taste and health values, brand, manufacturing traditions, regional origin or tighter control of the production process. Changes in consumer preferences, greater awareness of nutrition etc. signal to the producer to focus his attention, among other things, on the development of an organic product. The production of an organic agricultural product is legitimate and represents an opportunity to improve competitiveness in agriculture. This evolution should be directed towards the production of products with low chemical content, in line with the promotion of sustainable agriculture[2].

In the traditional approach, innovation (change) is the result of a process that initiates the generation of a certain idea (concept) of a new solution in the field of product, manufacturing technology, or new systems in the field of management, but also culture and ecology. In the field of technology and engineering, innovation is embodied in the form of an invention, which has a specific tangible or intangible form that can be described by a set of features and characteristics. If an invention is also characterised by the feature of usefulness and applicability with a specific value for the user, it can be called an innovation[3].

It is defined in the Oslo Manual. Innovation (innovation) is the implementation of a new or significantly improved product (product or service) or process, a new marketing method or a new organisational method in business practice, workplace organisation or public relations. This broad definition covers a wide range of possible innovations. Innovation can more narrowly be categorised as the implementation of one or more types of innovation, for example innovation within a product and process. The narrower definition of innovation within products and processes can be referred to the definition of technological innovation within products and processes used in the second edition of the Oslo Manual[4].

---

[2] M. Dacko, A. Płonka, Grupy producentów – szansa na zwiększenie konkurencyjności rozproszonego rolnictwa, „Wieś i Doradztwo" 2011; 1-2(65–66): 5-13.

[3] S. Łobejko, A. Sosnowska, Komercjalizacja wyników badań naukowych. Praktyczny poradnik dla naukowców, Urząd Marszałkowski Województwa Mazowieckiego w Warszawie, Departament Rozwoju Regionalnego i Funduszy Europejskich Wydział Innowacyjności, Warszawa 2013, p. 10.

[4] Podręcznik Oslo. Zasady gromadzenia i interpretacji danych dotyczących innowacji. Wspólna publikacja OECD i Eurostatu, Ministerstwo Nauki i Szkolnictwa Wyższego, Warszawa 2008.

It is assumed that the minimum requirement for an innovation to occur is that the product, process, marketing method or organisational method is new (or significantly improved) to the company. This includes products, processes and methods that a company has developed first and those that have been assimilated from other companies or entities. The Central Statistical Office uses a definition in which innovativeness is understood as the ability of enterprises to create and implement innovations and the actual ability to introduce new and modernised products, new or changed technological or organisational and technical processes. Innovations imply positive changes. They are associated with the need to meet the needs and expectations of a changing environment, but it should be remembered that the order is often reversed: it is the innovator who changes the environment – the innovator, with his solution, introduces a new quality to people's life[5].

Table 1. Overview of the definition of innovation

Innovation is the successful exploitation of a new idea. In the service sector, innovation occurs in all aspects of a service company's organisation. For this reason, it is difficult to distinguish "real" innovation from mere management craftsmanship, a "business-as-usual" approach, etc. Entrepreneurial management practitioners may have a problem qualifying their day-to--day activities: is a new questionnaire for periodic employee grading in a hotel chain already an "innovation in the hotel business" or just a "minor improvement developing the daily work of the hotel's HR department"? *Below are some definitions of innovation:* *Innovation is the extraction of economic value from new activities.* *(Innovation Vital Signs Project, 2007)* *Innovation arises at the intersection of invention and insight and leads to the creation of social or economic value.* *(Council of Competitiveness, 2005)* *Innovation refers to a wide range of activities to improve performance in firms, including the implementation of new or significantly improved products, services, distribution processes, production, marketing and organisation.* *(European Commission, 2004)* *Innovation - a combination of invention, insight and entrepreneurship that creates new industries, creates new value and creates valuable new jobs.* *(Business Council of New York State, 2006)* *The design, invention, development and/or implementation of new or revised products, services, processes, systems, organisational methods to create new value for customers and return on investment for the company.* *(Advisory Committee on Measuring Innovation in the 21st Century, US Department of Commerce)*

[5] J. Fazlagić, Czy Twoja firma jest innowacyjna? Jak poszukiwać innowacji w sektorze usług? Podpowiedzi dla MSP, PARP, Warszawa 2012, p. 19.

Innovation is the implementation of a new or significantly improved product (good or service) or process, a new marketing method or a new method of business organisation or external relations. Innovation activities are scientific, technological, organisational, financial or commercial in nature and are intended to lead to or result in the implementation of an innovation
(OECD, 2005)

Successful innovation is the extent to which value is created for customers through ventures that transfer new knowledge and technology into new profitable products and services in national and international markets. A high rate of innovation leads to the creation of new markets, economic growth, job creation, wealth and higher living standards.
(Innovation Vital Signs Project, 2007)

Innovation: is an implemented idea that creates new value or a new market.*
*(*new to a particular company, country or on a global scale)*
(Report on Polish Innovation Go Global!, VISTULA University, 2011)

Source: A. M. Aizorb, C. E. Moylan, C. A. Robbins, Toward Better Measurement of Innovation and Intangibles, „Survey of Current Business" 2009; 1: 14; Go Global! Raport o polskiej innowacyjności Go Global!, Uczelnia VISTULA, Warszawa 2011 [za:] J. Fazlagić, Czy Twoja firma jest innowacyjna? Jak poszukiwać innowacji w sektorze usług? Podpowiedzi dla MSP, PARP, Warszawa 2012, p. 20

Definitions of innovation in the world literature and types of innovation

Table 2. Definitions of innovation in the world literature

Autor	Definictions
J. Schumpeter[1]	The commercial or industrial application of something new: a product, process, production method; a new market or source of supply; a new form of business.
E. Mansfield[2]	An innovation is the first application of an invention.
M.E. Porter[3]	To the concept of innovation, M.E. Porter includes technological improvements, better methods, ways of doing a thing. This can manifest itself in product or process changes, new approaches to marketing, new forms of distribution.
R. Simonetti[4]	Innovation is a creative and interactive process involving the market and non-market institutions. Innovation consists of the creative use of different forms of knowledge that responds to market demand and the requirements set by the innovation society

[1] J. Schumpeter; Teoria rozwoju gospodarczego, PWN, Warszawa 1960.

[2] E. Mansfield, The Economics of Technological Change, W.W. Norton and Co, New York 1968.

[3] M.E. Porter, Competitive Strategy, Free Press, New York, 1980.

[4] R. Simonetti, D. Archibugi, R. Ewangelista, Product and process inovations: how they defined? How are they quantified, „Scientometrics" 1995; 32.

P. Drucker[5]	P. Drucker defined innovation as: 'a specific tool of entrepreneurs by means of which change makes the opportunity to undertake new economic activities or provide new services. Innovation is a specific tool of entrepreneurship – an activity that gives resources new opportunities for wealth creation.
P. Kotler[6]	P. Kotler referred to innovation as a good, service or idea that is perceived by someone as new. The idea may have already existed for a long time, but it represents an innovation to the person who perceives it as new.
R.W. Griffin[7]	Innovation is considered to be the directed effort of an organisation to master new products and services or new applications of existing products and services.
D. Begg, S. Fisher, R. Dornbush[8]	Innovation is 'the application of new knowledge to the production process
Council of Competitiveness 2005[9]	Innovation arises at the intersection of invention and insight and leads to the creation of social or economic value.
OECD 2005[10]	Innovation is the implementation of a new or significantly improved product (good or service) or process, a new marketing method or a new method of business organisation or external relations. Innovative activities are of a scientific, technological, organisational, financial or commercial nature and are intended to lead or lead to the implementation of an innovation.
Business Council of New York State 2006[11]	Innovation is a combination of invention, insight and entrepreneurship that creates new industries, creates new value and creates new valuable jobs.
Innovation Vital Signs Project 2007[12]	Innovation is about extracting economic value from new activities. Successful innovation is the extent to which value is created for customers through ventures that transfer new knowledge and technology into new profitable products and services in national and international markets. A high rate of innovation leads to the creation of new markets, economic growth, job creation, wealth and higher living standards.

[5] P. Drucker, Innowacja i przedsiębiorczość, PWE, Warszawa 1992.

[6] Ph. Kotler, Marketing. Analiza, planowanie, wdrażanie i kontrola, Gebethner i Ska, Warszawa 1994.

[7] R.W. Griffin, Podstawy zarządzania organizacjami, PWN, Warszawa 1996.

[8] D. Begg, S. Fisher, R. Dornbush, Makroekonomia, PWE, Warszawa 1997.

[9] Praca zbiorowa, Catalyzing Cross-Border Innovation: The Mexican Life Sciences Initiative. Phase I Report, Council of Cmpetetiveness, 2005.

[10] Podręcznik Oslo… op. cit.

[11] Business Council of New York State, http://www.bcnys.org/.

[12] B. Kalweit, E. Milbergs, R.S. Boege J.D Innovation Vital Signs Project, Technology Administration US Departament of Commerce, ASTRA, 2007.

Ross A. Webber[13]	Innovation is any research and development process whose primary objective is the application and use of improved solutions to technique, technology and organisation.
A. Pomykalski[14]	Innovation is a process involving all activities related to the creation of an idea, the creation of an invention and its implementation in the form of a product or process.

Source: own work

The main definitional differences shown in the table lie primarily in two different approaches to innovation. The first treats innovation as the pioneering application of a product or process. The second considers as innovation any subsequent application of them. Another factor that differentiates the definition of "innovation" is its perception. It is worth noting that until the mid-1990s "innovation" was understood as the implementation or application of an invention, product or process. It was not until R. Simonetti in 1995 emphasised that innovation is a creative and interactive process. He noted that the implementation of an innovation requires a variety of activities not only from the side of the adopter, but also from the market and non-market institutions. This formulation had an important influence on the further development of the concept of „innovation"[6].

Innovation is one of the primary sources of competitive advantage for companies, and in a highly competitive environment it even becomes the dominant attitude. In such a situation, an enterprise needs innovations in order to grow: new products, processes, services, organisation or management or marketing methods. These lead, on the one hand, to cost reductions and, on the other hand, provide an opportunity to gain/maintain market share by creating customer value. The process of continuous creation of new types of products and services is a picture of the intensity of structural change in the modern economy. Innovation is understood as an outcome and as a process.

There are essentially four types of (main) innovation: product innovation, process innovation, marketing innovation and organisational innovation.

Product innovation is the introduction of a new good or service to the market by a given company or the significant improvement of previously offered goods and services with respect to their characteristics or intended use. This includes significant improvements in terms of technical specifications, components and materials, embedded software, ease of use or other functional features. Product innovations (within products) may use new knowledge or technology or be based on new applications or combinations of existing knowledge and technology. The term "product" is used to designate both products and services. Product innovations include both the

[13] R.A. Webber, Zasady zarządzania organizacjami, PWE, Warszawa 1996.

[14] A. Pomykalski, Innowacje, Politechnika Łódzka, Łódź 2001.

[6] M. Baraniak, Finansowanie działalności innowacyjnej indywidualnych gospodarstw rolnych województwa łódzkiego, rozprawa doktorska, Uniwersytet Łódzki 2019, p. 32-34.

introduction of new products and services and significant improvements to existing products and services in terms of their functional or performance characteristics[7].

Process innovation means the introduction of new or significantly improved production or delivery methods into the practices of an enterprise. Significant changes in technology, equipment and/or software fall into this category. Process innovation may aim to reduce the unit cost of production or delivery, increase quality, produce or deliver new or significantly improved products. Production methods are the techniques, equipment and software used to produce products or services. Examples of new production methods are the implementation of new equipment to automate the production process within a production line or the implementation of computer-aided design for product design and development[8].

A marketing innovation (marketing innovation) is the implementation of a new marketing method involving significant changes in product design / construction or packaging, distribution, promotion or pricing strategy. The aim of marketing innovation is to better meet customer needs, open new markets or reposition the company's product in the market to increase sales. The distinguishing feature of marketing innovation among other changes in a company's marketing instrumentation is that it involves the implementation of a marketing method not previously used by the company in question. It must be part of a new marketing concept or strategy representing a significant departure from the marketing methods used so far. The new marketing method can be developed by the innovative company in-house or assimilated from other companies or entities. New marketing methods can be implemented for both new and existing products[9].

For example, a marketing innovation is the first use of significantly different media/media or techniques – such as product placement in films or television programmes, or the use of a famous person portrayed as a user of a product (celebrity endorsement). Another example is branding, i.e. the creation and introduction of a completely new brand symbol (as opposed to regular adjustments to the visual layer of the brand) to position a company's product in a new market or to give the product a new image. The introduction of a system of personalised information, e.g. obtained from loyalty cards, to tailor the presentation of products to specific customers can also be considered a marketing innovation. Pricing innovations consist of the application of new pricing strategies to sell a company's products or services on the market. Examples include the first use of a new method to adjust the price of a product or service according to demand (e.g. when demand is low, the price is also low) or the introduction of a new method to allow customers to select desired product features on a company's website and then check the price of the selected combination of features.

Organisational innovation (organisational innovation) is the implementation of a new organisational method in a company's adopted operating principles, in the

[7] Podręcznik Oslo… op. cit, p. 50.

[8] Ibidem, p. 51.

[9] Ibidem, p. 52.

organisation of the workplace or in its relations with the environment. The purpose of organisational innovation can be to achieve better performance by reducing administrative or transaction costs, increasing job satisfaction (and thus productivity), gaining access to non-tradable assets (such as non-codified external knowledge) or reducing supply costs. A distinguishing feature of organisational innovation in comparison with other organisational changes in a company is the application of such an organisational method (in the operating principles adopted by the company, in the organisation of the workplace or in the relations with the environment), which has not been applied in a given company before and which results from strategic decisions taken by its management. Organisational innovation in terms of the company's business practices involves the implementation of new methods of organising the company's routines and procedures. This includes, for example, the implementation of new practical rules to improve learning and knowledge sharing within the company[10].

An example would be the first implementation of practical rules to codify knowledge, e.g. creating a database of best practices, lessons learned and other knowledge in a way that makes it as easily accessible as possible to others. Another example would be the first implementation of practical rules to develop staff and improve staff retention (retention) rates, for example education and training systems. Still another example would be the first introduction of production or supply management systems, e.g. supply chain management systems, as well as the fundamental transformation of processes in a company (business reengineering) or lean production and quality management systems.

Workplace organisation (workplace organisation) innovation involves the implementation of new methods of distributing tasks and decision-making powers among employees in order to divide up work within divisions and between divisions (and organisational units). Such innovation is also the implementation of new concepts for structuring activities, such as the integration of different company activities. An example of organisational innovation in terms of workplace organisation is the first implementation of an organisational model that gives the company's employees more autonomy in decision-making and encourages them to contribute their ideas. This can be achieved through the decentralisation of group activities and management control, or the establishment of formal or informal work teams in which the job responsibilities of individual employees are defined more flexibly. Organisational innovation can also involve centralising activities and increasing accountability for decisions.

The introduction of build-to-order production systems for the first time can be cited as an example of organisational innovation in structuring company activities. Another example is the integration of sales and production or the integration of design and development work with production. New organisational methods in the field of external relations consist in the implementation of new ways of organising relations with other companies or public institutions, such as the establishment of new types of cooperation with research institutions or customers, new methods of integration with suppliers,

[10] Ibidem, p. 53.

as well as the first outsourcing or subcontracting of elements of activity such as production, procurement, distribution, recruitment or support services. Organisational innovations are not such changes in the accepted principles of operation, organisation of the workplace or in relations with the environment that are based on organisational methods already used by the company before. Nor is the mere formulation of a management strategy an innovation. On the other hand, organisational changes implemented in response to a new management strategy constitute an innovation if it is the first implementation of a new organisational method in terms of operating principles, workplace organisation or relations with the environment.

For example, the introduction of a written strategy document to improve the efficiency of knowledge utilisation in a company is not in itself an innovation. Instead, an innovation takes place when this strategy is implemented by using new software and information documentation rules to stimulate knowledge sharing between different branches of the company. Mergers with other companies and acquisitions of other companies are not considered organisational innovations, even if the company is merging or acquiring for the first time. However, mergers and acquisitions may involve organisational innovation if, in the process, the company develops or introduces new organisational methods[11].

An excellent example of organisational innovation in agriculture is the Short Food Supply Chain (SFSC), which shortens the distance between producer and consumer and minimises the number of intermediaries. The solution promotes understanding and communication between producer and consumer, which fosters loyalty and increases the value of agricultural products. Some of the divisions are only applicable under certain conditions. Thus, the competitiveness of food products depends, among other things, on the efficiency of supply chain management. This requires the company to apply modern management concepts that introduce a philosophy of partnership in supply chains and decisions made by market process participants. These imply innovative measures such as rapid chain rotation, efficient customer service (ECR), the QR concept or the supply chain reference model (SCOR).

Organisational innovations primarily concern people and the organisation of work. Examples of this type of innovation can be the implementation of a new organisational method in the principles of operation adopted by the entity and the implementation of new methods of organising routine activities and procedures governing work (e.g. improving the process of knowledge sharing / knowledge transfer within the organisation – company). The aim of organisational innovation is to achieve better performance by reducing administrative or transaction costs, increasing job satisfaction (and thus productivity), gaining access to non-tradable assets (such as non-codified external knowledge).

Absolute innovation. Among the many types of innovation, there is also the concept of absolute innovation, which boils down to the ability to create and then implement an absolute novelty (organisational, technological, product, etc.). Innovation of

[11] Ibidem, p. 49-55.

this type is associated with a high degree of uncertainty and risk, but nevertheless, in the event of success, it provides the implementer with a "priority bonus"[12].

Another type of innovation is relational innovation, which consists of the ability to implement specific solutions that are new only in a fixed context, place and time. An example of this type of innovation is, for example, the implementation in an organisation of procedures or technologies that are new to that organisation (see the example of the Kaizen ideology mentioned above or the ISO series of standards). Relational innovation is closely related to imitative modernisation.

Another type of innovation is disruptive innovation, otherwise known as radical innovation. Their characteristic feature is that they occur very rarely, but when they do, they completely change the market situation. These are products / services that are completely new, which have not been on the market before, or similar to existing products / services, but based on a completely new technology, allowing for new possibilities of operation. Examples of such innovations are, for example, mobile phones or 2D usg cameras. A breakthrough innovation that is "picked up" by the market is then refined in the form of further incremental innovations. Incremental innovations (incremental innovations) are the result of systematically modifying, improving an existing product/service so that it meets the needs of potential customers to an ever greater and better extent (e.g. 3D and 4D ultrasound machines). This type of innovation occurs much more frequently than breakthrough innovations, requires less money, shorter lead times and is a source of competitive advantage for many years.

A different type of innovation is open innovation, the essence of which is the use of valuable knowledge resources or technologies produced outside the organisation. This type of innovation allows the efforts of customers, consumers, researchers and others to be combined in a single innovation process. It creates the possibility for stakeholders to be more open to new, innovative ideas, facilitates access to complementary resources and the use of synergies, but also reduces the risk of action / I nvestment[13].

Mix innovations are an alternative to open innovation. They are used to deftly combine opportunities to develop innovations within an organisation, while at the same time exploiting opportunities to collaborate with other external actors, they are used in open innovation. An organisation that intends to implement innovation can do so in two ways: take creative action and develop innovations in-house (either on its own or with external partners), adapt innovations produced by other companies or institutions to its own circumstances.

The first way focuses on the organisation's research and development activities. It may conduct research in order to: acquire new knowledge, targeting specific inventions and aimed at modifying existing techniques.

---

[12] R. Drozdowski, A. Zakrzewska, K. Puchalska, M. Morchat, D. Mroczkowska, Wspieranie postaw proinnowacyjnych przez wzmacnianie kreatywności jednostki, Polska Agencja Rozwoju Przedsiębiorczości, Warszawa 2010.

[13] Dobre praktyki innowacyjne. Podręcznik przedsiębiorcy, Urząd Marszałkowski Województwa Mazowieckiego, Warszawa 2010.

The second modality, referred to as other innovation activities, focuses on carrying out activities aimed at, among other things:

- obtaining a new product/service concept through the marketing activities of the entity/entities and its relationship with users,
- obtaining a new concept of products/services through the entities' ability to carry out design and development work,
- obtaining a new product concept by monitoring the competition,
- purchase of know-how,
- purchase of other consulting services, internal and/or external training of employees, which can result in the generation of innovations,
- reorganising the ways of functioning (management systems) of the company in order to generate innovation, developing new methods of marketing and/or selling its products / services.

Innovative activity can lead to both the generation and implementation of innovations in the short term and to the enhancement of the innovative capacity of an entity. By creating and implementing innovations, the entity learns, gains valuable insights from contacts and marketing activities, and improves its innovative capacity through organisational changes[14].

Incremental innovations – are now becoming increasingly important (alongside radical innovations). They are also referred to by some authors as follow-on technologies and technologies that interrupt the course of development of some industry[15]. A radical innovation (radical innovation) or disruptive innovation (disruptive innovation) is an innovation that significantly affects the market and the companies operating in it. What is emphasised here, therefore, is not so much the novelty aspect as the impact of such an innovation[16].

Pricing innovation involves the application of new pricing strategies for selling a company's products or services in the market. Examples include the first use of a new method to adjust the price of a product or service according to demand (e.g. when demand is low, the price is also low) or the introduction of a new method that allows customers to select the desired product features on a company's website and then check the price of the selected combination of features. New pricing methods whose sole purpose is to differentiate prices for particular segments of buyers are not considered innovations.

---

[14] Przewodnik budowania lokalnej strategii innowacji opracowany w ramach projektu „Sieć Regionalnych Obserwatoriów Specjalistycznych", Główny Instytut Górnictwa, Katowice 2015, p. 21-23.

[15] C. Christensen, The Innovator's Dilemma. When New Technologies Cause Great Firms to Fail, Harvard Business School Press, 1997.

[16] B. Dobiegała-Korona, Wartość dla klientów generatorem wartości przedsiębiorstwa, [in:] Współczesne źródła wartości przedsiębiorstwa, B. Dobiegała-Korona, A. Herman (ed.), Difin, Warszawa 2006.

Conclusions

Business innovation activity is a very broad concept and refers to activities of a scientific, technical, organisational, financial and commercial nature that lead or are intended to lead to the implementation of innovations. Some of these activities are innovative in nature, while others are not novel, but are necessary for the implementation of innovation. Innovative activities also include research and development (R&D) activities that are not directly related to the creation of a specific innovation. The phenomenon referred to as innovation is constantly transforming and evolving.

The classic division of innovation distinguishes between four types of innovation:

1. product innovation – the introduction to the market of a product or service that is new or substantially improved in its characteristics or uses. This includes significant improvements in terms of technical specifications, components and materials, embedded software, ease of use or other functional characteristics. Product innovation can result from the application of new knowledge or technology or new applications or a combination of existing knowledge and technology;
2. process innovation – the implementation of new or significantly improved methods of producing, distributing and supporting products and services. Process innovations include new or significantly improved methods of creating and providing services. They may consist of significant changes to the hardware and software used for service activities or changes to the procedures and techniques used to provide services. Process innovations also include new or significantly improved techniques, equipment and software in support activities such as procurement, accounting, IT suport;
3. marketing innovations – implementation of a new marketing concept or strategy significantly different from the marketing methods used so far in a given enterprise;
4. organisational innovation – implementation of a new organisational method in the principles of operation adopted by the enterprise (including knowledge management), in the organisation of the workplace or in its relations with the environment, which has not been applied so far in the given enterprise.

Among the main objectives of innovative activity indicated by Polish enterprises is improving the quality of products or services and increasing the range of products or services. In third place was the goal related to company expansion – entering new markets or increasing market share. For some Polish entrepreneurs, one of the most important objectives of innovative activity is to improve the health or safety of employees, as well as to reduce environmental damage. The average share of innovative enterprises in the total number of industrial and service sector enterprises in Poland in 2021 was 17,5%. For innovative enterprises, the most important among the indicated sources of information for innovation is the enterprise itself. For 47% of enterprises in Poland, the above-mentioned source of information is rated as high and this result is slightly below the average for EU countries (49%). In second place, suppliers are indicated and this result is below the average for EU countries, which was 27%. In Poland, in third place, according to frequency of indications, customers or

consumers are indicated as a significantly high source of information for innovation. Drawing knowledge from actual or potential buyers of products is very important from the point of view of sales strategies for innovative products.

Next in line as a potential source of information for innovation indicated by Polish companies was the activity of competitors, followed by information coming from scientific institutions (universities and research institutes). The introduction of innovations in enterprises is of particular importance in times of strong economic turbulence, whether in Europe or worldwide. An important role in leading economies out of recession and searching for new, sustainable sources of economic growth is played by dynamically developing enterprises through the introduction of innovations: new products, services, technologies, new organisational or marketing solutions.

The share of innovative enterprises (active in terms of product or service innovation and innovative in terms of marketing and organisational innovation) is one of the basic dimensions of innovative activity and determines the level of innovativeness of enterprises in a given country. The level of innovativeness of economic entities is a result of, among other things, the objectives adopted by enterprises, the areas of innovative activity of enterprises, the expenditures incurred for innovative activity, as well as the availability of public support for activity of an innovative nature.

There are very general criteria by which to assess whether a product/service is innovative. The most relevant starting point for this grade is the statement that "innovation in an organisation refers to planned changes in the activities of an organisation to improve its performance". Thus, innovation will refer to changes characterised by the following features:

- Innovation involves uncertainty about the outcome of the innovation activity. It is not known in advance what the outcome of the innovation activity will be, e.g. whether the research and development work will lead to the successful development of a marketable product, or how much time and resources will be required to implement a new production process, marketing or organisational method and to what extent the effort will be successful.
- Innovation requires investment. The investment needed may relate to the acquisition of tangible or intangible assets and other activities (such as wages or the purchase of materials or services) that have the potential for future profits. Innovation involves transfer. The rights to the benefits of creative innovations are rarely fully exploited by the originating firm. Firms whose innovation activity involves the absorption of innovations from outside may benefit from knowledge transfer or from the use of original innovations. For some innovation activities, the costs of imitation are much lower than the costs of producing it in-house, so an effective mechanism for acquiring rights to innovations may need to be developed to provide an incentive to work on their creation.
- Innovation entails the use of new knowledge or a new application or combination of existing knowledge. New knowledge can be generated by the innovative firm in the course of its innovation activity (i.e. through internal R&D activities) or acquired externally through various channels (e.g. purchase of new technology).

The application of new knowledge or the combination of existing knowledge requires an innovative effort that can be distinguished from standard, routine ways of doing things.

Bibliography

Baraniak M., Finansowanie działalności innowacyjnej indywidualnych gospodarstw rolnych województwa łódzkiego, rozprawa doktorska, Uniwersytet Łódzki 2019.

Begg D., Fisher S., Dornbush R., Makroekonomia, PWE, Warszawa 1997.

Business Council of New York State, http://www.bcnys.org/.

Christensen C., The Innovator's Dilemma. When New Technologies Cause Great Firms to Fail, Harvard Business School Press, 1997.

Dacko M., Płonka A., Grupy producentów – szansa na zwiększenie konkurencyjności rozproszonego rolnictwa, „Wieś i Doradztwo" 2011; 1-2(65–66): 5-13.

Dobiegała-Korona B., Wartość dla klientów generatorem wartości przedsiębiorstwa, [in:] Współczesne źródła wartości przedsiębiorstwa, B. Dobiegała-Korona B., Herman A. (ed.), Difin, Warszawa 2006.

Dobre praktyki innowacyjne. Podręcznik przedsiębiorcy, Urząd Marszałkowski Województwa Mazowieckiego, Warszawa 2010.

Drozdowski R., Zakrzewska A., Puchalska K., Morchat M., Mroczkowska D., Wspieranie postaw proinnowacyjnych przez wzmacnianie kreatywności jednostki, Polska Agencja Rozwoju Przedsiębiorczości, Warszawa 2010.

Drucker P., Innowacja i przedsiębiorczość, PWE, Warszawa 1992.

Fazlagić J., Czy Twoja firma jest innowacyjna? Jak poszukiwać innowacji w sektorze usług? Podpowiedzi dla MSP, PARP, Warszawa 2012.

Griffin R.W., Podstawy zarządzania organizacjami, PWN, Warszawa 1996.

Kalweit B., Milbergs E., Boege R.S., Innovation Vital Signs Project, Technology Administration US Departament of Commerce, ASTRA, 2007.

Kokot-Stępień P., Zarządzanie innowacjami jako źródło konkurencyjności małych i średnich przedsiębiorstw, „Organizacja i Zarządzanie" 2017; 114: 222-227.

Kotler Ph., Marketing. Analiza, planowanie, wdrażanie i kontrola, Gebethner i Ska, Warszawa 1994.

Łobejko S., Sosnowska A., Komercjalizacja wyników badań naukowych. Praktyczny poradnik dla naukowców, Urząd Marszałkowski Województwa Mazowieckiego w Warszawie Departament Rozwoju Regionalnego i Funduszy Europejskich Wydział Innowacyjności, Warszawa 2013.

Mansfield E., The Economics of Technological Change, W.W. Norton and Co, New York 1968.

Podręcznik Oslo. Zasady gromadzenia i interpretacji danych dotyczących innowacji. Wspólna publikacja OECD i Eurostatu, 2005. Wydanie trzecie w polskiej wersji: Ministerstwo Nauki i Szkolnictwa Wyższego, Warszawa 2008.

Pomykalski A., Innowacje, Politechnika Łódzka, Łódź 2001.

Porter M.E., Competitive Strategy, Free Press, New York 1980.

Praca zbiorowa, Catalyzing Cross-Border Innovation: The Mexican Life Sciences Initiative. Phase I Report, Council of Cmpetetiveness, 2005.

Przewodnik budowania lokalnej strategii innowacji opracowany w ramach projektu „Sieć Regionalnych Obserwatoriów Specjalistycznych", Główny Instytut Górnictwa, Katowice 2015.

Schumpeter J., Teoria rozwoju gospodarczego, PWN, Warszawa 1960.

Simonetti R., Archibugi D., Ewangelista R., Product and process inovations: how they defined? How are they quantified, „Scientometrics" 1995; 32.

Webber R.A., Zasady zarządzania organizacjami, PWE, Warszawa 1996.

*Sylwia Skrzypek-Ahmed**
*Ruth Andah***
*Indira Karibayeva****
*Krzysztof Dyrek*****
*Marcin Szkudlarek******

INNOVATION ACTIVITY AS A PROCESS OF UNCERTAINTY

Działalność innowacyjna jak proces niepewności

*PhD., Assoc. Prof., WSEI University in Lublin, ORCID: 0000-0002-1211-0683
**PhD., Assoc. Prof., Nasarawa State University in Keffi, ORCID: 0009-0009-5507-748X
***Prof., PhD., DsC, Kazahstanskiy Medicinskiy Universitet VSHOZ in Kazachstan, ORCID: 0000-0003-2976-6643
****MA, School of Business – National-Louis University in Nowy Sącz (WSB-NLU), ORCID: 0009-0002-3108-4369
*****WSEI University in Lublin, student

Streszczenie

Innowacyjność powinna być rozpatrywana szeroko, ponieważ jest to proces o dużym stopniu niepewności i złożoności. Jest on również mało uporządkowany i podlega wielu różnym zmianom, co przejawia się w trudności jej mierzenia. Według S. Kline'a i N. Rosenberga innowacyjność musi być uznawana za sekwencję zmian w systemie produkcyjnym, rynkowym i społecznym. Podstawowy problem, który związany jest z innowacyjnością dotyczy jej przyjęcia w środowisku, w którym funkcjonujemy. Powinna ona bowiem zostać zaakceptowana przez kulturę i społeczeństwo, w którym żyjemy. Należy tutaj również brać pod uwagę zdolności i motywację do ciągłego poszukiwania i wdrażania nowych idei i pomysłów, co z kolei prowadzi do wykazania na poziomie makroekonomicznym tzw. luki technologicznej, określającej różnice w zamożności poszczególnych krajów.

Słowa kluczowe: *innowacje, proces innowacyjny, racjonalność, efektywność, ekonomika innowacji, zarządzanie procesowe*

Summary

Innovation should be considered broadly because it is a process with a high degree of uncertainty and complexity. It is also unstructured and subject to many different changes, which is reflected in the difficulty of measuring it. Innovation must be

considered as a sequence of changes in the production, market and social system. The basic problem associated with innovation concerns its acceptance in the environment in which we operate. It should be accepted by the culture and society in which we live. It should also take into account the ability and motivation to constantly search for and implement new ideas and concepts, which in turn leads to the demonstration, at a macroeconomic level, of the so-called "technology gap", which determines the differences in wealth between countries.

Key words: innovation, innovation process, rationality, efficiency, economics of innovation, process management

Introduction

Innovation should be considered broadly because it is a process with a high degree of uncertainty and complexity. It is also unstructured and subject to many different changes, which is reflected in the difficulty of measuring it. According to S. Kline and N. Rosenberg[1] Innovation must be considered as a sequence of changes in the production, market and social system. The fundamental problem with innovation concerns its acceptance in the environment in which we operate. It should be accepted by the culture and society in which we live. The ability and motivation to constantly search for and implement new ideas and concepts should also be taken into account here, which in turn leads to the demonstration, at a macroeconomic level, of the so-called "technology gap"[2], determining differences in wealth between countries. The issue of innovation can be considered, like entrepreneurship, on a micro scale, i.e. at company level, and on a macro scale in relation to the whole economy, country or region. Economic innovativeness is defined as the ability and motivation of entrepreneurs to continuously search for and put into practice new ideas, concepts, inventions and the results of research and scientific work[3,4]. The condition for an economy to be innovative is for as many innovative enterprises as possible to operate in it. Innovation is the process of creating and implementing innovations under such conditions that allow innovative strategies to be pursued in enterprises. It can be interpreted as the enlargement or improvement of an enterprise's product range and as the creation of new methods in management, production or other areas of

[1] S. Kline, N. Rosenberg, An overview on Innovation, [in:] The Positive Sum Strategy: Harnessing Technology for Economic Growth, R. Landau, N. Rosenberg (ed.), National Academy Press, Washington 1986, p. 275-306.

[2] J. Bogdanienko, Innowacje jako czynnik przewagi konkurencyjnej, [in:] Innowacyjność przedsiębiorstw, J. Bogdanienko, M. Haffer, W. Popławski (ed.), Wyd. Uniwersytetu Mikołaja Kopernika, Toruń 2004, p. 7-62.

[3] W. Wiszniewski, Innowacyjność polskich przedsiębiorstw przemysłowych, Orgmasz, Warszawa 1999, p. 9.

[4] W. Janasz, K. Janasz, A. Świadek, J. Wiśniewska, Strategie innowacyjne przedsiębiorstw, Wyd. Uniwersytetu Szczecińskiego, Szczecin 2001, p. 299.

enterprise activity. Innovation at the microeconomic level, on the other hand, means distinguishing and specifying a specific, feedback-connected activity, which is the result of an intellectual network process and of subjective and institutional linkages evolving over time[5].

In the literature on the subject, the interpretation of the concept of innovation is based on four approaches focused on6:

- the individual and their characteristics influencing the creation of innovation (education, creativity, gender, etc.), structure, where the main emphasis is placed on the relationship between the organizational structure and innovation and between the enterprise and its environment;
- interactive links, answering the question: how a designated activity affects the innovation process and vice versa, systemic creation of innovations, the aim of which is to decide how national and regional innovation systems can influence the innovation activity of enterprises.

Definition of innovation it is very often referred to:

- technological changes, where innovation is defined as the predisposition to absorb new technological changes[7], the possibility of developing new technologies or, as the ability to take action that goes beyond the current state of knowledge;
- behavioral changes, where innovation is identified with the speed of adaptation to changes and the ability to create new ideas and openness to changes;
- tendency to change in the area of production and creation of products or provision of services[8].

Innovation in a multidimensional perspective

It means predispositions and positive attitude towards creating and implementing changes in every area of socio-economic life of enterprises and the ability of the enterprise to deal with and enter into new ideas, concepts or inventions, the result of which are new products and services[9]. It applies to all economic entities that have the ability to conduct development research, effectively develop new ideas for manufacturing / improving processes, products or services and are able to apply these ideas in practice. In order for enterprises to effectively introduce and commercialize innovations on domestic and foreign markets, they must apply the principle of purposeful innovation and entrepreneurial management and strategies in their operations,

[5] K. Janasz, Kapitał a decyzje innowacyjne w przedsiębiorstwie, „Przegląd Organizacji" 2009; 10: 35.

[6] J. Baruk, Zarządzanie wiedzą i innowacjami, A. Marszałek, Toruń 2006.

[7] S. Kitchell, Corporate Culture Environmental Adaptation, and Innovation Adoption: A Qualitative/Quantitative Approach, „Journal of the Academy of Marketing Science" 1995; 23(3): 195-205.

[8] G. Foxal, Corporate Innovation: Marketing and Strategy, St. Martin's Press, New York 1984, p. 35.

[9] G. T. Lumpkin. G. G. Dess, Clarifying the Entrepreneurial Orientation, Construct and Linking It to Perfermance, „Academy of Management Rewiev" 1996; 21(1): 135-172.

because innovation is a tool for entrepreneurship[10]. Innovation must be a feature of every enterprise, because the competitive entities on the market are those that have a significant share in innovative activities and use all market mechanisms. It can also be viewed at the individual, organizational and macroeconomic levels[11].

- At the individual level innovation is determined by innovation competence, which determines the characteristics of an individual that determine his or her attitude in the process of change.
- Organizational innovation is considered through the prism of its innovation potential, which is understood as the ability of an economic entity to develop projects, implement and disseminate innovations.
- In turn, the innovativeness of the economy / regions is characterized as the ability and willingness of entities of this economy / region to continuously search for and use in economic practice the results of scientific research and research and development work, new concepts, ideas, inventions, improvement and development of the technologies used for material and immaterial production (services), introduction of new methods and techniques in organization and management, improvement and development of infrastructure and knowledge resources[12].

Therefore, innovation, which is by its nature based on novelty, is strongly linked to the supply of new knowledge. The demand for knowledge and, consequently, the use of knowledge in economic processes led to the formulation of the concept of a "knowledge-based economy (KBE)". In this concept, modern strategies for economic growth, company development and, finally, the shaping of the prosperity of nations are created around innovation. As the authors of the dictionary "Innovations and technology transfer" write: there is a dynamic shift in the structures of developed economies towards knowledge-based industries and services[13]. Since this phenomenon has not only been observed in the most developed countries, but is also confirmed by the way developing economies function, we can no longer speak of individual events but of entire sectors and industries in which innovation and innovation are becoming a way of life.

Based on this trend, also in Poland, the most dynamic, competition-oriented companies create new products, patterns of conduct, technologies and finally services. It should be remembered that these processes very rarely take place in one, even the largest, company[14]. They usually take place in specific cooperative arrangements that include enterprises and their networks, scientific and research institutions, local government, public administration and government, as well as non-governmental

[10] L. Kwieciński, K. Moszkowicz, J. Sroka, Innowacyjność i internacjonalizacja dolnośląskich małych i średnich przedsiębiorstw, Wyd. A. Marszałek, Toruń 2007, p. 11.

[11] K. B. Matusiak, Innowacje i transfer technologii. Słownik pojęć, Polska Agencja Rozwoju Przedsiębiorczości, Warszawa 2005, p. 74–77.

[12] A. Wasilewska, M. Wasilewski, Stan, kierunki i efektywność innowacji w przedsiębiorstwach przetwórstwa rolno-spożywczego, SGGW, Warszawa 2016, p. 31.

[13] K. B. Matusiak, Innowacje i Transfer… op. cit.

[14] We are then dealing with the phenomenon of closed innovation.

organizations and civic initiatives. In a knowledge-based economy, the responsibility for stimulating growth dynamics through support mechanisms, e.g. financial, increasingly falls on the regions. The interdependence of the effects obtained in the form of the pace of regional development and regional policies is becoming more and more visible[15]. Companies (organizations/institutions) that do not introduce innovations are threatened with stagnation and elimination from the market. Of course, innovation processes run with different intensity in different industries and different regions, which briefly reflects the size and nature of competitive pressure[16]. This distinction is not merely a formal matter, but has important substantive consequences.

– In the first meaning, innovation is treated as a result, the outcome of the application of progress in knowledge, invention.
– In the second sense, innovative phenomena include not only the final result of the implementation of a specific technical solution, but also the activities preceding its creation. Innovation in this approach is a process that includes in the broadest sense the creation of an idea, research and development and design work, production and dissemination. Treating innovation as a process is a consequence of changes observed in practice in the relationships and dependencies between science, technology and production, which take place in the modern economy and which are expressed by the convergence of these types of activities.

Innovation activity as an economic and social process

Innovative activity – according to the Oslo Manual, these are all activities (undertakings) of a scientific (research), technical, organizational, financial and commercial (commercial) nature, the purpose of which is to develop and implement innovations. Some of these activities are innovative in themselves, while others may not contain an element of novelty, but are necessary for developing and implementing innovations.

Innovative activity may be conducted by the company itself on its own premises (in-house) or it may involve the acquisition of goods and services, including knowledge or consulting services, from external sources. This is sometimes referred to as the acquisition of external technology in a tangible (embodied) or intangible (disembodied) form. Innovative activity it is a high-risk activity and not all innovative projects end in success, i.e. with the implementation of the innovation, but the very fact that the company undertakes such activity has great practical significance, contributing to the increase of its knowledge and skills, which may result in the implementation of innovation in the future. The Oslo Manual distinguishes three kinds of innovation activity conducted by an enterprise in a given, specific period of time:

[15] A. Brzęska-Mikoda, Innowacje w Firmie – Szanse dla Kreatywnych, Chorzów 2009.

[16] Podręcznik Oslo. Zasady gromadzenia i interpretacji danych dotyczących innowacji. Wspólna publikacja OECD i Eurostatu, 2005. Wydanie trzecie w polskiej wersji: Ministerstwo nauki i Szkolnictwa Wyższego, 2008, p. 17.

- successful innovation activity, i.e. implementation of an innovation (irrespective of whether the implemented innovation was commercially successful or not);
- activity not yet completed by the implementation of the innovation, i.e. ongoing activity that is still in progress at a given time (ongoing innovation activity);
- innovation activity that was interrupted for some reason or abandoned before the innovation was implemented (abandoned innovation activity).

Therefore, innovation activities are the entire set of scientific, technical, organizational, financial, and commercial activities that actually lead to, or are intended to lead to, the implementation of innovations. Some of these activities are innovative in nature, while others are not new, but are necessary for the implementation of innovations. Innovation activities also include research and development (R&D) activities that are not directly related to the creation of a specific innovation. The common feature of innovations is that they have been implemented. A new or improved product is implemented when it is introduced to the market. New processes, marketing methods, or organizational methods are implemented when they are actually used in the company's operations. Innovation activities can have a very diverse nature, depending on the specifics of the company. Some companies conduct clearly defined innovation projects, for example, creating and introducing a new product, while others primarily make continuous improvements to their products, processes, and operations. Both types of companies can be considered innovative: innovation can consist of implementing one significant change or a series of smaller, incremental changes that together constitute a significant change. S. Christow sees three factors that determine innovation: innovation potential (generally knowledge), propensity to introduce innovations (generally invention), propensity to adopt innovations (generally openness).

We can imagine a situation in which companies operating in Poland are the authors of innovative ideas, but Polish consumers are not willing to buy them. Then the only solution is export. However, the Polish domestic market is large enough to allow for the development of less innovative businesses: many domestic companies are satisfied with lower turnover realized on the Polish market. This specific "lack of ambition" is a certain barrier to innovation[17].

R&D as a specific type of innovative activity

Specific innovation activities that can be used by organisations to create or acquire innovations[18]. R&D activities which include the following: the organisation may conduct basic and applied research to acquire new knowledge and research directly aimed at specific inventions or modifications of existing techniques, and the

[17] S. Christow, Czym jest dla mnie innowacyjność? Co intuicyjnie nazywamy innowacją?, tekst niepublikowany. [za:] J. Fazlagić, Czy Twoja firma jest innowacyjna? Jak poszukiwać innowacji w sektorze usług? Podpowiedzi dla MSP, PARP, Warszawa 2012, p. 30-31.

[18] Por. Podręcznik Oslo, op. cit., p. 38-39.

organisation may develop new product or process concepts or other new methods to assess whether they are feasible and economically reasonable; at this stage, there may be: a) development and testing, and b) further research to modify designs or technical functions[19]. When it comes to innovation activities other than R&D, an organisation can undertake a number of activities that are not part of R&D but are part of innovation. These activities may enhance the organisation's ability to create innovations or its ability to successfully assimilate innovations developed by other companies or institutions. In addition, the organisation may acquire new product concepts, processes, marketing methods or organisational changes:

- through its marketing activities and relationships with users,
- through the identification of commercialisation opportunities arising from its own basic or strategic research or from such research conducted by others,
- by its design and development capabilities, o by monitoring its competitors, as well as by using consultants.

An organisation can purchase technical information:

- by paying royalties and fees for patented inventions (which usually requires R&D to adapt and modify the invention to its own needs) or buy know-how and skills in the form of engineering and construction or other consultancy services;
- human skills can be developed (through in-house training) or acquired (by hiring new people);
- tacit and experiential learning (learning by doing) can also come into play;
- the organisation may invest in equipment, software or inputs used indirectly in production, incorporating the results of the innovation activities of others;
- the organisation can reorganise its management systems and the whole system of its activities;
- a company may develop new methods of marketing and selling its products and services.

The ultimate goal of all these types of innovative activities is to improve the organisation's performance. The aim of the activities may be the development and implementation of new products and processes, new methods of promoting and selling products and/or changes in organisational practices and the organisational structure of the company[20].

For example, innovative activity in agricultural services consists of the adoption of new technologies, while the agri-food industry is a developer of new technological solutions. These technologies originate from independently conducted development research. Service innovations, on the other hand, are mostly based on externally acquired knowledge. In order to show the difference in innovativeness between manufacturing and services, it can be stated that what patents are to the manufacturing sector, trademarks are to the service sector. This means greater competition in the

[19] Por. Podręcznik Frascati. Pomiar działalności naukowo-badawczej. Proponowane procedury standardowe dla badań statystycznych w zakresie działalności badawczo-rozwojowej. OECD, Organizacja Współpracy Gospodarczej i Rozwoju. Ministerstwo Nauki i Szkolnictwa Wyższego, Warszawa 2010.

[20] Podręcznik Oslo… op. cit., p. 39.

service sector, as it is easier to enter a market, but at the same time more difficult to maintain that market and remain in a leading position[21].

Types of innovation activity by time factor

Innovation activity conducted in a given period may be of three types:

- the activity was completed successfully, i.e. with the successful implementation of the innovation (although there is no requirement that it also be a commercial success);
- ongoing activities, i.e. activities in progress that have not yet led to the implementation of the innovation;
- activities discontinued before the innovation was implemented.

The innovation process is internally diverse and multi-phase. The nature of the innovation process is not fully explained. This term should be understood as a creative activity consisting in creating, designing and implementing innovations. In other words, the innovation process can be defined as all activities necessary for the creation and practical application of new technical solutions, which include new or modified products, manufacturing processes and organizational changes. The concept of innovative activity has a similar meaning. However, when it comes to a specific technical solution and its application in the economy, then we can talk about an innovative undertaking.

Linear models of innovation (linear model of innovation – "from research to production"). These are early models of the innovation process. According to contemporary theories, although R&D activity is a very important and unquestionable source of innovation, innovation and innovativeness are more complex and much broader concepts and phenomena than just R&D activity, with which they were identified until recently, as described by the aforementioned linear models of innovation (linear model of innovation – "from research to production"). These models dominated until the mid-1970s. They emphasized the causal role of scientific and technical achievements (discoveries, inventions). Here, we can list models referred to as: a simple linear model of "innovation pushed by science" (technology-push) or a model of "pulled by the market" (need-pull).

According to the first model, achievements in the sphere of basic research through applied research lead to the development of a new industrial technique (new products and technological processes), which are followed by various production phases, and finally by market activities. The last phase, i.e. diffusion, means the process of penetration (absorption) of innovations to subsequent enterprises, as well as the penetration of innovations on the scale of a single enterprise. An example illustrating innovations that actually proceed in a linear manner are programs for the development of a specific product, group of products or technology. In the second case, the innovation process is also multi-phase and usually includes:

[21] K. Gula, Czy ktoś widział innowacje w usługach, „Innowacyjny Start" 2007; 2(5): 18.

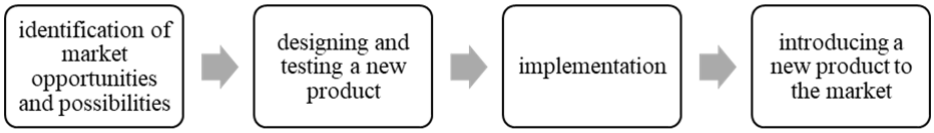


Figure 1. Multi-phase innovation process
Source: own work

According to this model, technical innovations are the result of perceiving market or social needs. The market is seen as a source of ideas, inspiration for R&D. The success of the enterprise depends therefore on tracking mainly short-term market needs, searching for market opportunities for creating a set of modified products. In linear models we are dealing with a more or less passive role of the user of innovation and the market, who is simply a passive recipient of the results of scientific and technological progress or current market signals. Innovation Policybased on such models, the main emphasis is placed on supply factors (scientific and technical possibilities) or demand factors (market and social needs). However, most innovations do not proceed according to linear models. Their application in the practice of enterprise management was one of the reasons for many failures of innovative projects, mainly due to the long implementation period and numerous organizational barriers.

Dynamic interaction models of the innovation processalready in the late 1970s they were replacing linear models. They are more complex and contain numerous interactions and feedbacks during the period of innovation creation and diffusion. They explain innovations both as the result of feedbacks between technical possibilities (generated by science and technology) and needs (generated by the market or production), and as a rich set of interactions between science, technology and implementation activities within the firm.

Their characteristic feature is the assumption that innovation processes can take place within a company, without referring to research and to the expert advice of other specialists outside the organization. However, at any point in the innovation process, it is possible to access, as needed, the accumulated knowledge created by science. Today, innovation is becoming more and more clearly a network and systemic process, in which innovations are the result of numerous complex interactions between individuals, organizations and the environment. This is evidenced by the rapidly growing number of both various types of horizontal agreements in the form of strategic alliances, cooperative relationships in the field of R&D and new product development, as well as vertical ties between enterprises. The role and significance of ties with suppliers in the product and technology development strategy of many enterprises has increased in particular. The share of small innovative companies is growing in these rapidly growing and increasingly complex external ties. The innovation process is characterized by specific features that allow it to be distinguished from regular industrial production. It is a particularly complex, complicated and difficult process. This is primarily due to the fact that innovations, by connecting four

spheres like clasps: science, technology, production and market, concentrate within themselves the features of all these spheres.

The basic features of the modernly understood innovation process are as follows[22,23,24, 25,26,27,28]:

1. Innovation is an interactive and multidisciplinary process.
2. Innovation only in exceptional cases depends solely on technological know-how. In most cases, in addition to R&D work, the source of innovation is also acquired specific experience and knowledge, including managerial and general level of education, contacts with users and suppliers, competitors, etc.
3. Innovation processes are localized. This means that the creation and diffusion of innovations takes place in a specific space, which is associated with the occurrence of high-quality development and other location factors resulting from agglomeration and urbanization processes.
4. Innovation is an integration process. This means that efficient and effective implementation of innovation requires high skills in the field of business management. This concerns the integration of goals, tasks and functions including marketing, research and development, design, supply and production.
5. Innovation is a learning process. This means that innovation is the result of accumulating specific knowledge and information useful for the company's activities. It is an interactive process that uses internal and external sources.
6. The innovation development cycle (research and implementation) is relatively long and difficult to define a priori.
7. Innovations are expensive and risky. Expenditures on innovations are characterized primarily by: uniqueness resulting from the nature of the innovation process itself, relatively long freezing period, unevenness.

Coupling modelis one of the most commonly used models of the innovation process in developed economies. From the point of view of this model, innovation is a logically cyclical, although not always continuous process, which may consist of a series of functionally separate, but interconnected and interdependent phases. It is of little importance in which phase of the interconnected model the idea for a specific innovative undertaking appears. What is important is that the enterprise couples technological potential with market needs at the earliest possible stage of the innovation process.Polandeconomy is characterized by the fact that innovation processes currently take place in it according to the model of innovation "pushed" by science

[22] Green Paper on Innovation, European Commision ECSC-EC-EAEC, Brussels/Luxembourg 1996.

[23] S. Kwiatkowski, Społeczeństwo innowacyjne, PWN, Warszawa 2000.

[24] S. J. Kline, N. Rosenberg, An Overview of Innovation [in:] The Positive Sum Strategy, R. Landau, N. Rosenberg (ed.), National Academy Press, Washington 1986.

[25] Technology and Economy. The Key Relationships, OECD, Paris 1992.

[26] M. Dodgson, R. Rothwell, The Handbook of Industrial Innovation, Edward Elgar Publishing Ltd, Aldershot-Brookfield 1994.

[27] J. Guinet, National Systems for Financing Innovation, OECD, Paris 1995.

[28] Oslo Manual. Guidelines for Collecting and Interpreting Innovation Data, Third Edition, OECD/Eurostat, Paris 2005.

and "pulled" by the market. However, the first model is most common. In a situation where the Polish economy achieves the status of a fully market economy, then the most frequently chosen model will be the feedback model of the innovation process.

Innovative company

Innovative company is a company that has implemented an innovation in the period under consideration. Such a broad definition of an innovative company will not always meet the needs of public policy or research activities. In many cases, a narrower definition may be useful, especially when comparing innovations across sectors, company size categories, or countries. An example of a narrower definition is one that refers to companies that innovate in products or processes. Product / process innovative firmis a company that has implemented a new or significantly improved product or process during the period under review. This definition, which includes all companies that have implemented a product or process innovation, is similar to the definition of a "TPP innovative firm")[29]. Thus, the process of commercializing research results is accompanied by a chain of creating value for the customer in the university and the company.

A modern enterprise should be innovative, open to new things, able to search for market signals and ready to introduce innovative changes. This is inextricably linked to developing its innovativeness through professional and competent management and creating working conditions that will be interesting and attractive to people. With the emergence of innovativeness, the competitiveness of an enterprise increases, so it can be considered one of its features, characterized by: searching for, creating and implementing various types of innovations, the ability to make decisions in a situation of risk or uncertainty, the ability to constantly observe the market, capture signals from it and quickly respond to needs emerging on the market, the ability to observe and predict the actions of competitors, or to break innovation inertia. An innovative enterprise is one that is able to create, acquire and absorb innovations and gain information about innovative solutions. The innovativeness of an enterprise is the introduction of a new solution in the field of organization and management, technology or marketing. Here, we can also define the innovativeness of an enterprise as the improvement and development of operating and production technologies, concerning services, the sphere of organization and management, and the collection, processing and sharing of information[30].

Innovative enterprise according to the OECD methodology,such an economic entity that has implemented at least one innovation (product or process) in a specified, usually three-year period, provided that it is new to it. An innovative enterprise is defined as an intelligent organization that permanently generates innovations and

[29] Tamże, s. 48-49.

[30] S. Gopalakrishnan, Unraveling the Links Between Dimensions of Innovation and Organizational Performance, „The Journal of High Technology Management Research" 2000; 11(1): 137-153.

implements innovative projects to produce products and services that are appreciated by recipients due to their high level of modernity and competitiveness. It can be said that the concept of innovation defines the results of an enterprise's innovation activity at a given time and place.

According to another definition: an innovative enterprise is one that[31]:

- conducts research and development work on a large scale or purchases new product/technology projects, allocating relatively large financial outlays for this purpose,
- systematically implements new scientific and technical solutions and introduces innovations to the market in a continuous and stable manner,
- has a significant share of new products in the total number of products or services.

Innovative companies are most often called[32]:

- innovators, i.e. individuals who are the first to adopt new ideas and regularly introduce innovations,
- early adopters, more cautious in their actions than innovators, but characterized by a high propensity to introduce innovations,
- late majority – they adopt innovations with a significant delay, usually under the influence of economic calculations or market pressure,
- laggards, i.e. organizational units that are the last among the units of a given type of activity to introduce innovations.

The enterprise itself should develop a form and pattern of innovative behavior, both internally and in contacts with the environment.

The most important attributes of an innovative enterprise are:

- the ability to generate innovation,
- creativity,
- the ability to use innovation potential to maintain a competitive position,
- high competence,
- the ability to predict changes in the environment,
- the ability to recognize customer needs and meet them,
- having a team of innovators,
- flexibility and the ability to adapt to a changing and turbulent environment.

An innovation active company and the gradation of innovativeness

Innovation-active companyis a company that conducted innovation activity in the period under consideration, including ongoing and discontinued activity. In other words, innovation-active companies are companies that conducted innovation activity in the period under consideration, regardless of whether their activity led to the implementation of innovation or not. In the period covered by the statistical survey, new companies may be established, either created entirely from scratch or as

[31] After: A. H. Jasiński, Innovative enterprise, KiW, Warsaw 1997, p. 25.

[32] After: J. Duraj, M. Papiernik-Wojdera, Entrepreneurship and innovativeness, Difin, Warsaw 2010, p. 88.

a result of mergers, divisions or other types of reorganization. The innovativeness of these companies (innovative company or innovation-active company) is determined in the same way as for all other companies.

Assessment of the company's level of innovation. It can be defined in several ways. The basic definition of an innovative company is that it is a company that has implemented at least one innovation, while a product or process innovator is defined as a company that has implemented a product innovation or a process innovation. There are also other ways of classifying innovative firms, depending on public policy and research needs. Such classifications can be used to determine what percentage of firms (by size class, sector, country, or other factor) introduce each of the four types of innovations, or implement a combination of several types of innovations (for example, product innovations together with marketing innovations, or process innovations together with organizational innovations). Classification by innovation criterion can also take into account other information (for example, data on the entity that created the innovation) that can be used to identify firms that are only engaged in adopting innovations in products and processes developed in other firms. It may happen that during the period under consideration, firms will conduct innovation activities but will not actually implement the innovation. All activities related to the development or implementation of innovations, including implementations planned for the future, are classified as innovation activities. Innovation of the agri-food enterpriseis considered as a one-dimensional phenomenon, meaning the ability of a person / group to generate and effectively apply new ideas[33], or as the ability of an enterprise to continuously search for, apply in practice and disseminate innovations, leading to an increase in its modernity and strengthening of its competitive position on the market[34],[35] and as a successful introduction to practice of a new thing or method[36].

The minimum criterion for a change in a firm's products or functions to be considered an innovation is that it should represent something new (or a significant improvement) for the firm.All innovations must – by definition – contain an element of novelty. The value of understanding the novelty of innovation is: new to the company or market, a novelty on a global scale and so-called disruptive innovations. There are two main reasons for using the criterion of "new to the firm" (organization) as the minimum requirement for innovation.

– First, the introduction of innovations is important for the innovation system as a whole. It involves the flow of knowledge to firms adopting innovations. Moreo-

[33] R.B. Bouncken, Cultural diversity in innovation teams: surface and deep level effects, „International Journal of Business Research" 2009; 4: 17-26.

[34] A. Pomykalski, Innovativeness of organizations, Wyd. Wyższa Szkoła Kupiecka, Łódź 2009, p. 8.

[35] E. Stawasz, The main areas of driving forces and tensions in the system of technology transfer and commercialization in Poland. Conditioning of the development of knowledge-based entrepreneurship, „Scientific Papers" 2011; 642: 13.

[36] R. Richard, R. Katz, Managing Creativity and Innovation, Harvard Business School Press, Boston 2003, p. 2.

ver, the learning process during the introduction of innovations can result in improvements of the innovation and the development of new products, processes, and other innovations.

– Second, the main impact of innovation on economic activity comes from the diffusion of initial innovations to other firms.

Data on the creator of the innovation also concern the element of novelty and diffusion, indicating whether the innovations are primarily created within the enterprise (organization), or in cooperation with other enterprises or public research institutions, or perhaps primarily created outside the enterprise (organization). New to the firmis the minimum criterion for the occurrence of an innovation. It may happen that a given product, process, marketing method or organizational method has already been implemented in other companies, but if they are new for the company considered in the study (and in the case of products and processes – if they are significantly improved), then we are dealing with an innovation in this company. New to the market andnew to the worldindicate whether a given innovation has already been implemented by other companies or whether the company in question was the first to implement a given innovation on a market, in a sector or worldwide. Companies that are the first creators of an innovation can be considered the engines of the innovation process. Many new ideas and new knowledge are created in these firms, but the economic impact of the innovation will depend on whether other firms also adopt the innovation. Information on the degree of novelty can be used to identify developers and adopters of innovations, to study diffusion patterns, and to identify market leaders and followers. An innovation is said to be new to a given market if a company is the first to introduce the innovation in its market. The market is defined in a simple way: it is a company and its competitors, and the market may include a geographic region or a product line. The territorial scope of the newness to the market therefore depends on how the company itself perceives its market of operation, which means that the market may include both domestic and foreign companies.

An innovation constitutes a global first when a company is the first to introduce the innovation in all markets and sectors, both domestically and internationally. Novelty on a global scale therefore means a qualitatively higher degree of novelty than in the case of novelty to the market. In many studies, questions about novelty to the market will provide sufficient data on the degree of novelty of an innovation. The question about novelty on a global scale, in turn, provides an additional opportunity to collect information in those statistical studies whose purpose is to examine in more depth the aspect of novelty of an innovation.

Radical innovation/ disruptive innovation-it can be defined as an innovation that has a significant impact on the market and on the economic activity of companies in that market. This concept focuses on the effects of the innovation, not on the aspect of novelty. These effects may, for example, consist in changing the market structure, creating new markets or leading to a situation in which existing products become obsolete. However, it may happen that the breakthrough of an innovation will not be visible for a long time after its implementation. This fact is an obstacle to collecting data on breakthrough innovations in the period covered by the statistical survey.

Diffusion of innovation and degree of novelty

Innovations create new knowledge that then diffuses, expanding the economy's potential to create new products and more efficient methods of operation. Such beneficial phenomena depend not only on technical knowledge but also on other forms of knowledge that are used to create product and process innovations, as well as marketing and organizational innovations. There can be significant differences between specific types of information in terms of the impact they have on the efficiency of companies and on economic change. For this reason, it is important to be able to determine that an innovation has been implemented and what effects each type of innovation has had[37].

An organization that wants to change its products/services has two options. It can invest in creative activities and develop innovations in-house – either alone or together with external partners – or it can adopt innovations developed by other companies or institutions through a diffusion process. It should be noted, however, that innovations do not necessarily have to be created by the firm itself, but that firms can acquire innovations from other firms or institutions through the process of diffusion. Diffusion refers to the way in which innovations are disseminated, through market and non-market channels, from initial implementation to contact with different consumers, to presence in different countries, regions, sectors, markets and firms. Without diffusion, innovations would not have economic significance.

Diffusioncan be captured by including in the research innovations that are new to a given company. It should be noted that the handbook does not cover the diffusion of a new technology to other divisions or parts of the same company after its initial introduction or commercialization. For example, the first implementation of a new production technology in one of the five factories belonging to the same company is treated as an innovation, but the implementation of the same technology in the other four factories is not[38].

Conclusions

Innovation is an important driver of economic growth and international competitiveness. The question then arises how to stimulate innovation, in which sectors and with which instruments / methods? In the field of the agri-food economy, innovation is the development and implementation of new concepts and technologies that improve the quality of products and services or increase production efficiency. An example is information technology, which has changed the way goods and services are produced and sold, while creating new markets and business models. One of the most important effects of innovations is their impact on economic growth. In

[37] Oslo Manual… op. cit., p. 35.

[38] OECD 2005, Oslo Manual… op. cit.

a nutshell, they can lead to increased productivity, i.e. achieving more output with the same inputs. Numerous innovations have been initiated precisely in Europe and it continues to be an innovative region; we undoubtedly have the potential to further strengthen our innovativeness.

According to the World Economic Forum's Global Competitiveness Report, there are only three Eurozone countries in the world's top ten. The gap in the amount of resources devoted to R&D by the euro area and other major developed economies has persisted for some time. On top of this, the diffusion of innovation in the euro area appears to be slow. Recent research by the ECB has shown that there is a large productivity gap between the highest and lowest performing companies in this area. This means that while well-performing, pioneering companies are highly innovative, the so-called "marauders" benefit only marginally from innovation. Structural measures to support innovation include increasing spending on research and development and investing in education, as well as making it easier for entrepreneurs to set up new companies and more quickly withdraw bankrupt entities from the market. Innovation can also be supported by companies themselves by investing in their employees and conducting their own research and development.

Regardless of the size of the business, effective management of innovation processes is a key element of a company's competitiveness. This is because the competitive advantage is determined by the susceptibility to implement any product and technological changes, changes in the management system or in communication with potential product users. In spite of many factors limiting the implementation of innovations in small and medium-sized agri-food enterprises, their implementation is essential, as it allows these (often family-owned) companies to further develop and adapt more effectively to changes in their environment, conquer new markets, and thus achieve competitive advantage. The need to meet the ever-increasing demands of customers and growing competition motivates small and medium-sized enterprises to introduce changes in various areas of their operation.

For the proper development of an enterprise, it is very important to develop a strategy to promote innovation, as its absence becomes the most common cause of a decline in competitiveness. The ability to create and make proper use of innovations is an important element determining the efficiency of an economic entity and the possibility of its further development in a competitive market. The aim of business development management should be to shape technical, organisational and economic progress, and organisational innovations relating to the management sphere, together with product innovations, are among the most important factors shaping the competitiveness of enterprises, including small and medium-sized business units.

Bibliography

Baruk J., Zarządzanie wiedzą i innowacjami, A. Marszałek, Toruń 2006.

Bogdanienko J., Innowacje jako czynnik przewagi konkurencyjnej, [in:] Innowacyjność przedsiębiorstw, Bogdanienko J., Haffer M., Popławski W. (ed.), Wyd. Uniwersytetu Mikołaja Kopernika, Toruń 2004.

Brzęska-Mikoda A., Innowacje w Firmie – Szanse dla Kreatywnych, Chorzów 2009.

Bouncken R.B., Cultural diversity in innovation teams: surface and deep level effects, „International Journal of Business Research" 2009; 4: 17-26.

Christow S., Czym jest dla mnie innowacyjność? Co intuicyjnie nazywamy innowacją?, tekst niepublikowany. [za:] J. Fazlagić, Czy Twoja firma jest innowacyjna? Jak poszukiwać innowacji w sektorze usług? Podpowiedzi dla MSP, PARP, Warszawa 2012.

Dodgson M., Rothwell R., The Handbook of Industrial Innovation, Edward Elgar Publishing Ltd, Aldershot-Brookfield 1994.

Duraj J., Papiernik-Wojdera M., Przedsiębiorczość i innowacyjność, Difin, Warszawa 2010.

Foxal G., Corporate Innovation: Marketing and Strategy, St. Martin's Press, New York 1984.

GE Global Innovation Barometer 2011. An Overview on Messaging, Data and Amplification, General Electric, 2011.

Gopalakrishnan S., Unraveling the Links Between Dimensions of Innovation and Organizational Performance, „The Journal of High Technology Management Research" 2000; 11(1): 137-153.

Guinet J., National Systems for Financing Innovation, OECD, Paris 1995.

Green Paper on Innovation, European Commision ECSC-EC-EAEC, Brussels/ Luxembourg 1996.

Gula K., Czy ktoś widział innowacje w usługach, „Innowacyjny Start" 2007; 2(5): 18.

Janasz K., Kapitał a decyzje innowacyjne w przedsiębiorstwie, „Przegląd Organizacji" 2009; 10: 35.

Janasz W., Janasz K., Świadek A., Wiśniewska J., Strategie innowacyjne przedsiębiorstw, Wyd. Uniwersytetu Szczecińskiego, Szczecin 2001.

Jasiński A. H., Przedsiębiorstwo innowacyjne, KiW, Warszawa 1997.

Kitchell S., Corporate Culture Environmental Adaptation, and Innovation Adoption: A Qualitative/Quantitative Approach, „Journal of the Academy of Marketing Science" 1995; 23(3): 195-205.

Kline S., Rosenberg N., An overview on Innovation, [in:] The Positive Sum Strategy: Harnessing Technology for Economic Growth, Landau R., Rosenberg N. (ed.), National Academy Press, Washington 1986.

Kwiatkowski S., Społeczeństwo innowacyjne, PWN, Warszawa 2000.

Kwieciński L., Moszkowicz K., Sroka J., Innowacyjność i internacjonalizacja dolnośląskich małych i średnich przedsiębiorstw, Wyd. A. Marszałek, Toruń 2007.

Lumpkin G. T., Dess G. G., Clarifying the Entrepreneurial Orientation, Construct and Linking It to Perfermance, „Academy of Management Rewiev" 1996; 21(1):135-172.

Matusiak K. B., Innowacje i transfer technologii. Słownik pojęć, Polska Agencja Rozwoju Przedsiębiorczości, Warszawa 2005.

Podręcznik Frascati. Pomiar działalności naukowo-badawczej. Proponowane procedury standardowe dla badań statystycznych w zakresie działalności badawczo-rozwojowej. OECD - Organizacja Współpracy Gospodarczej i Rozwoju. Ministerstwo Nauki i Szkolnictwa Wyższego, Warszawa 2010.

Oslo Manual. Guidelines for Collecting and Interpreting Innovation Data, Third Edition, OECD/Eurostat, Paris 2005.

Podręcznik Oslo. Zasady gromadzenia i interpretacji danych dotyczących innowacji. Wspólna publikacja OECD i Eurostatu, 2005. Wydanie trzecie w polskiej wersji: Ministerstwo nauki i Szkolnictwa Wyższego, Warszawa 2008.

Pomykalski A., Innowacyjność organizacji, Wyd. Wyższej Szkoły Kupieckiej, Łódź 2009.

Richard R., Katz R., Managing Creativity and Innovation, Harvard Business School Press, Boston 2003.

Stawasz E., The main areas of driving forces and tensions in the system of technology transfer and commercialization in Poland. Conditioning of the development of knowledge-based entrepreneurship, „Scientific Papers" 2011; 642: 13.

Technology and Economy. The Key Relationships, OECD, Paris 1992.

Wasilewska A., Wasilewski M., Stan, kierunki i efektywność innowacji w przedsiębiorstwach przetwórstwa rolno-spożywczego, SGGW, Warszawa 2016.

Wiszniewski W., Innowacyjność polskich przedsiębiorstw przemysłowych, „Orgmasz", Warszawa 1999.

*Magda Ahmed**
*Iwona Kawka***
*Gbenga Ibileye, Bashir Adewale Adeniyi****
*Usman Alhaji Yusuf*****
*Tomasz Połomski******

CHANGE MANAGEMENT IN THE IMPLEMENTATION OF NEW PRODUCTS

Zarządzanie zmianą w procesie wdrażania nowych produktów

*WSEI University in Lublin, student
**MA, School of Business – National-Louis University in Nowy Sącz (WSB-NLU), ORCID: 0009-0007-8152-8702
***PhD., Assoc. Prof., Federal University Lokoja in Nigeria, ORCID: 0000-0002-8562-1759
****PhD., Assoc. Prof., Nasarawa State University in Keffi, ORCID: 0009-0002-3870-0013
*****PhD., School of Business – National-Louis University in Nowy Sącz (WSB-NLU), ORCID: 0009-0006-5699-7948

Streszczenie

Zmiana to wszelkiego rodzaju przekształcenia zachodzące (wprowadzane) w różnych obszarach funkcjonalnych organizacji. To tak naprawdę rozwój i jednocześnie dostosowywanie, dokonujące się pod wpływem czynników wewnętrznych i zewnętrznych. Zmiana ma na celu zwiększenie efektywności funkcjonowania danej organizacji, często optymalizacji działań lub – co ma pejoratywny wydźwięk – reorganizacji. Zmiana jest więc uważana za synonim innowacji lub – co może lepiej brzmi – dynamiki i dojrzałości organizacyjnej. Należy tu jednak pamiętać, że zmiana jest procesem ciągłym. Jej wprowadzenie powinno cechować się celowością, a więc założeniem wystąpienia czegoś pożądanego – jakiegoś celu.

Słowa kluczowe: *zarządzanie zmianą, zarządzanie procesem, efektywność organizacji, innowacje, dojrzałość organizacji, marketing*

Summary

Change is any kind of transformation taking place (introduced) in the various functional areas of an organization. It is in fact, a development and, at the same time, an adjustment, following the influence of internal and external factors. Change is aimed at increasing the efficiency of an organization's functioning, often optimizing

operations or – with pejorative overtones – reorganizing. Change is therefore considered to be synonymous with innovation or, perhaps more appropriately, with organizational dynamism and maturity. However, it is important to remember that change is an ongoing process. Its introduction should be characterized by purposefulness, i.e. the assumption of the occurrence of something desirable – some kind of goal.

Key words: change management, process management, organizational effectiveness, innovation, organizational maturity, marketing

Introduction

Change is all kinds of transformations taking place (introduced) in various functional areas of an organization.It is really development and at the same time adjustment, taking place under the influence of internal and external factors. The change is aimed at increasing the efficiency of the functioning of a given organization, often optimizing activities or – which has a pejorative connotation – reorganization. Change is therefore considered a synonym for innovation or – which may sound better – dynamics and organizational maturity. However, it should be remembered here that change is a continuous process. Its introduction should be characterized by purposefulness, i.e. the assumption of the occurrence of something desired – some goal. When do we identify change in an organization? When a significant external and/or internal factor appears, forcing the introduction of modifications. Such a factor is, for example, a change in regulations. We also deal with change when we want to obtain something new, different, changing the current order, which is tiring, disturbing or hindering our actions. We therefore deal with process management and their mapping, as well as reorganization.

Therefore:

- all change implementation models are similar to each other – they indicate almost the same dependencies and conditions (e.g. analysis, design and change control);
- the change process should be a step-by-step process, but tasks in a given step can be carried out in parallel;
- the process of introducing changes should be conscious, planned and effective in action;
- introducing change is not easy – it will always be associated with difficulty, effort and – for a shorter or longer period of time – a decrease in efficiency;
- the change should be well communicated (intra-organizational training);
- reorganization is not always synonymous with laying off employees – for example, it is the need for employees to acquire new knowledge, new skills, a change of position and scope of responsibility.

When designing a change, you should openly talk about a drop in quality and a slowdown in work for a certain period of time.It is worth considering the identification

of our change in terms of its impact on the organization. We can make a diagnosis of the organizational potential, based, for example, on the 7-S model[1]. It allows for a systemic approach to both factors – we ask ourselves a simple question, how, for example, a planned change in the area of strategy will affect the style of operation or employees and their skills. If we want to introduce, for example, a new system for managing an enterprise, we must analyze the remaining six "S". We must consider how the change in systems will affect our organizational structure, the company's strategy of operation, common values, the style of operation, the skills of employees and themselves. We do not skip any "S" – each area requires consideration. Only such an analysis allows us to find all possible dependencies and to a large extent prepare for the well effect.

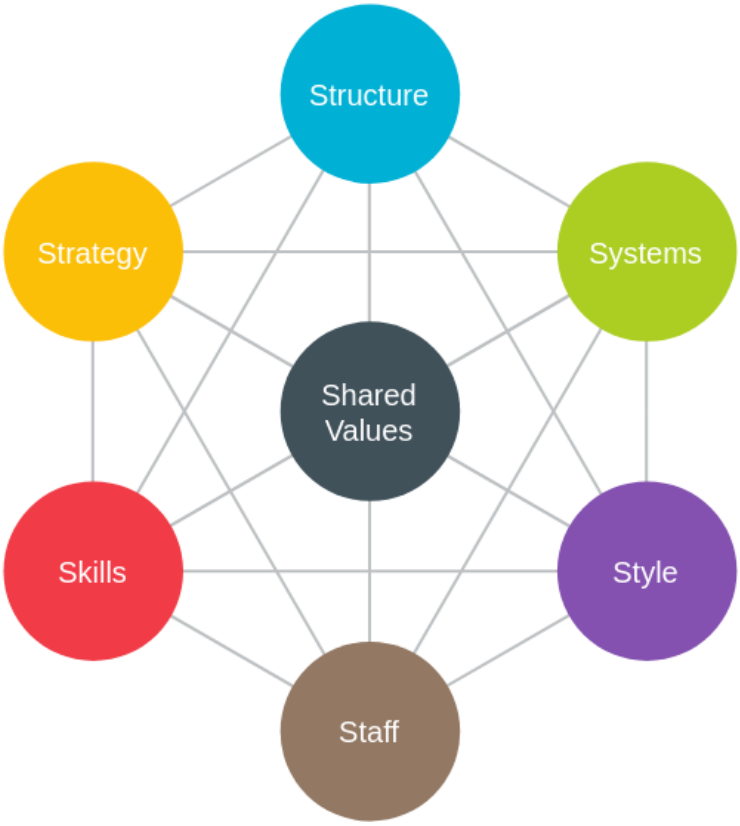


Figure 1. 7S Matrix

Source: McKinsey 7S Framework. Online: https://online.visual-paradigm.com/diagrams/templates/mckinsey-7s-framework/

People in the change process are the most important factor influencing the achievement of the goal. Firstly, employee behaviours determine success or failure

[1] R. H. Waterman, T. J. Peters, J. R. Phillips, Structure is not Organization, The Mckinsey Quarterly Summer 1980.

(resistance to change). Secondly, the great importance of the human factor stems from the fact that it is people who create an organisation, that it is thanks to them that it functions, acquires new customers, and develops. We must therefore remember that employees must understand and accept the change and accept new tasks and carry them out in accordance with the assumptions. Therefore, each change should be considered from the perspective of the employees who will be affected by it. We deal with change at every turn. Every organization is different – it has its own unique history, its own style of operation, knowledge and skills (know-how) and vision of the future. Therefore, there is no single, optimal method of implementing change. There are certain principles, models, tips, recommendations that we can use. This is possible through, among other things, understanding the way people work.

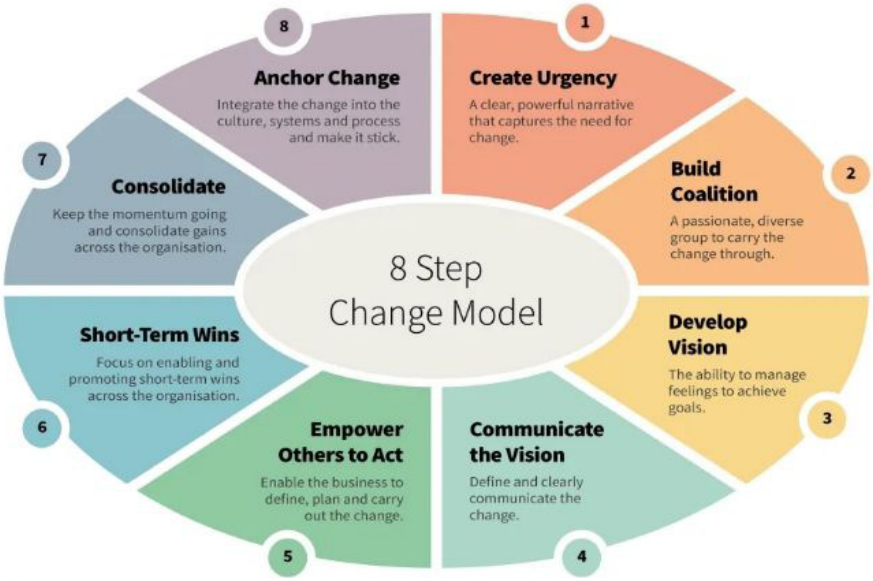


Figure 2. Kotter's 8-step approach to change management
Source: Kotter's 8 Step Change Model. Online: https://mutomorro.com/kotters-8-step-change-model/

How to implement change – change management in practice

1. Communication about upcoming changes. How do we communicate change inside the company and outside? Through what channels? In what way? Do we reach everyone (especially employees)? What image of transformation do we create?
2. Justification for the change. Why do we want to introduce changes? What benefits do they bring to the entire organization and what to individual departments / teams / employees? What results can the company's environment (customers, contractors, partners) expect?
3. Informing about its progres. Are all employees familiar with the procedures? Do they know what the next stages of implementing reforms look like? Do they

know how they can get support? Do they know what their role is in the context of change? Do employees feel they are participating in the change not only at the level of its implementation, but also in the process of its design?

4. Reporting on results. Do employees know how the technical implementation of changes ended? Have we provided them with the opportunity to evaluate and leave us comments on the changes so that they feel part of the process?

Implementation of new services as a change in the organization

In order for the change to be properly designed and then implemented, its course must be taken into account. Lewin[2] proposed a three-step model for successful change. Success should be achieved when the individual steps are managed appropriately. The first phase is defrosting. This disrupts the stability of currently dominant attitudes and behaviors. At this stage, an attitude of readiness for change should be created, the need for it should be realized, and old habits should be questioned. This process must take into account the inherent threats inherent to change. The correct course of the cycle depends on the acceptance of the entire change. Therefore, it is necessary to "defrost" the currently prevailing norms, standards, habits, and only then implement the change itself. The level of readiness of an organization for change can be measured using the formula proposed by DB Gleicher[3]: C = (A x B x D) > X

Where:

- C – readiness to change,
- A – level of dissatisfaction with the existing situation,
- B – clearly defined and sufficiently attractive desired state (goal, expected effects),
- D – first practical actions in the desired direction,
- X – costs of change (emotions, energy, effort, financial outlays).

Readiness to change will occur when the cost is not too high. The company is dealing with this situation when:

- Dissatisfaction with the status quo is strong enough.
- The future state is clearly defined and sufficiently attractive.
- Practical actions can be taken to achieve the desired state.

The second phase is the change itself. This stage consists of the implementation of the change process, which depends on, among other things, the structure of the organization, the dependencies and processes occurring within it.

The third phase is the so-called stabilization and freezing. This is the phase that ends the change process. It is expected that the changes will be "freezed" again so that they can be maintained for some time. Here, a process of normalization takes place, integrating many existing forms of behavior. They become new standards of employee work.

[2] K. Lewin, Group decision and social change [in:] Reading in social psychology, T. Newcomb, E. Hartley (ed.), New York 1947.

[3] Cited after: J. Stoner, Ch. Wankel, Management, PWE, Warsaw 2007.

At the beginning of the implementation of each newmethodsproject or tool, employees can go through different phases. That is why it is so important to define the individual phases. Determining how and when we will present the implementation of a new tool depends on the phase in which employees from the covered area are. Providing appropriate support to the crew is an action that always bringssuccess. Phases that employees may be in during change implementation: megation, anger, fear, resistance, deconcentration, adaptation, regaining balance, action and initiative. To provide support during the negation phase, you should: explain exactly what the changes are, pass on the facts and pass on the same to everyone information and distinguish between what is and what is not negotiable.

Recommendations for effective change management:

1. Let employees express their emotions.
2. Be open to their feelings.
3. Don't promise that everything will be fine.
4. Explain the benefits and next steps.
5. Don't let yourself be isolated.
6. Guide and affirm attitudes that support change.
7. Remind everyone what the goal is.
8. Emphasize and accept that some mistakes will occur.

More and more often, managers treat change not only as an opportunity, but also as a necessity. The contemporary functioning of an organization is shaped by the so-called triad: selection-compensation – Change. These elements form three basic pillars of the organization's existence. Organizational changes can be divided into quantitative and qualitative. The former indicate differences in the size of one or severalparameters, while the latter indicate new behaviours, properties and reactions of the distinguished system.Developmentand is treated in terms of positive changes concerning a given goal that have been achieved. We speak of growth or degradation when we are dealing with quantitative changes. The ability to predict changes is a problem that their introduction creates. Due to this issue, changes can be divided into reactive and proactive. Reactive changes are carried out by analysis and diagnosis. In order to find the best solution, you must first recognize the existing state and possible weaknesses of the organization. Speed and relatively lowcosts, are the main advantages of reactive change. Unfortunately, it has been noticed that as the need for change becomes more obvious, theCostresponse. It is therefore worth taking care of the appropriate time to implement changes, because the longer you wait, theeffectivenesschanges decreases. In proactive changes, the search for the optimal solution precedes the construction of a model based on synthesis. It is created as a forecast, it is not a reflection of any specific object. Thisresultcreative thinking, research on development trends. This means that it can only be applied in the future. It is therefore a heuristic process. To a limited extent, it is possible to take as a basis already existing phenomena and objects.

There are usually five steps in change management[4,5]:
- identifying the cause indicating the need for change,
- specifying the end point or "where we want to be",
- planningcarrying out the change,
- implementationchanges,
- ensuring that the changes will be permanent.

Effective change managementincludes changes at the personal level, such as changes in mood or procedures; hence, effective change requiresskillspersonnel management such asmotivating. Other factors that have an important influence on the success of change management are leadership style,communicationand uniformpositive attitudeto changes among employees.Restructuringbusiness process is one of the types of change management. It involves the transformation of processes within the organization in order to increase the effectiveness of functioning. Change promoters are those people in the organization who are leaders and champions of the change process[6,7,8].

Resistance to changemeans emotional blockage. It is a certain mental stateMental load, which is manifested by taking actions that make it difficult or impossibleimplementationand maintaining the changes or refraining from actions contributing to the introduction of the change when these depend on the employees themselves. In the case of obstacles we speak of active resistance, in the second case we speak of passive resistance.

Resistance is revealed in the areastructuresformal and informal(conflicts of interest, bureaucratic heaviness,conformityactions), also in the entire social system of the enterprise, and above all in the psychological attitudes of employees and their mutual interactions. Resistance can take the form of an individual, group or global (i.e. encompassing all employees). It can be imaginary or real, pathological or constructive. It can manifest itself, among others, in open criticism of superiors, the formation of resistance groups among employees, an increase in indicatorsfluctuationandabsenteeism, or alsoefficiencywork.

The main causes of resistance include:
- lack of perception of the meaning of change by employees,
- uncertaintyregarding the effects and/or causes of changes,
- a fear of losing cherished values,
- awareness of the weaknesses of the proposed changes,
- a feeling of imposed change,
- decrease in abilityadaptiveand creativity of employees,

---

[4] E. Rasiegel, P. Friga, The McKinsey Mind, KE Liber sc, Warsaw 2004.

[5] A. Stabryła,Company development management, AE Publishing House in Krakow, Krakow 1996.

[6] J. R. Turner, V. Kristoffer, L. Thurloway, The project manager as change agent. Proceedings of the 2002 Australian Institute of Project Management 2002.

[7] E. Wiącek-Janka,Changes and conflicts in the organization, Poznań University of Technology Publishing House, Poznań 2006.

[8] A. Zarębska, Organizational changes in an enterprise: theory and practice, Difin, Warsaw 2002.

- inertia of habits,
- decreased sensitivity to stimulation,
- lack of self-interest,
- lawLe Chatelier's perversity,
- the ethos of standing your ground,
- cognitive dissonance.

Four styles of resistance:

- Stuck in place – this is an entity behaving as if nothing has changed, as if no change has occurred.
- Saboteur – an individual who opposes change but does not do so openly.
- Zombie – this is an extreme case of a unit standing still.
- Opponent – an entity that openly expresses resistance to change.

Stages of adaptation to change

There are many models that deal with employee adaptation to change. C. Carnall seems to be quite general and illustrative. It distinguishes the following stages:

- Refusal – this is the initial situation whenemployeelearns of the intention to introduce a change. I communicatehe then usually has a sincere and deep conviction that it is unnecessary. Usually, there isconsolidationteam against change, and quality and efficiency work remains at the current level.
- Defense – when an individual realizes that change is inevitable, a defensive reaction occurs. Employees defend their positions and roles they have performed so far. Negative effects of such an attitude arise, i.e. a decrease in self-esteem or a decreasemotivationAt work.
- Rejection – here a change of perspective occurs, because individuals begin to look to the future, realizing that change is necessary. At the same time, self-esteem increases, which leads directly to the next stage, which is acceptance of change.
- Acceptance – employees accept the change and its consequences. The more units take part, the greater the acceptance.participationin the process of preparing and implementing the entire change.
- Internalization – employees find themselves in the situation "after" the change, and theirmotivation, and new ways of operating become natural behaviour for organisation members.

Rules for making changes

The most important rules for implementing changes[9,10,11,12,13]:

- Making changes is most effective when they areplanningthere is so much time to organize them.
- Once the change is announced, employees should be provided with as much information as possible.information.
- Employees' input will bear fruit when they themselves can influence the way tasks are performed.
- Those affected by the changes should, to the extent possible, plan the pace of their implementation themselves.
- It is worth remembering that resistance occurs because of employees' fear of the unknown.
- Resistance to change may also result from a lack of understanding of its purposes.
- Employees are more willing to make changes if they see commitment from the organization's management.
- Employees work better if they are rewarded for extra effort.
- Most organizations must change over time to survive in a turbulent environment.

Professional management of implementation of new products / services on an individual level

An effective system for managing the process of implementing new products/ services encourages cooperation between sales representatives and improves joint activities. Using a sales management system or CRM, you can improve the efficiency of the implementation process, the quality of the team's work, as well as automate some tedious tasks and achieve the set implementation and then sales goals[14]. Customer Relationship Management (CRM) that is, customer relationship management or customer contact management. When reading this name, the thought comes to mind that CRM systems are used solely to manage customer knowledge and the ability to monitor their behavior[15]. This is not true. One definition of CRM is: "the infrastructure to define and increase customer value and the appropriate means to motivate the best customers to be loyal—that is, to make repeat purchases".

---

[9] B. Kożusznik, Human Behavior in an Organization, PWE, Warsaw 2002, p. 220.

[10] B. R. Kuc, J. M. Moczydłowska, Organizational Behavior, Difin, Warsaw 2009, pp. 249-250, 256-257.

[11] A. Potocki, Zachowania organizacyjne. Wybrane zagadnienia, Difin, Warsaw 2005, pp. 288-301.

[12] S. P. Robbins, T. A. Judge, Zachowania w organizacji, PWE, Warsaw 2012, pp. 373-374, 376.

[13] J. M. Szaban, Zachowania Organizacyjne. Aspekt międzykulturowy, Wydawnictwo Adam Marszałek, Toruń 2012, p. 390-391.

[14] CRM-abc.pl Editorial Office - CRM-abc.pl - everything about CRM and Customer Relationship Management systems - CRM, http://www.crm-abc.pl/ (including subpages).

[15] A. Dejnaka, CRM - Customer Relationship Management, Helion, Warsaw 2002.

Customer Relationship Management systems have a huge potential to increase the importance of the customer for the company by providing the appropriate infrastructure and IT tools. It allows for a change in the customer-company relationship, which in the future must result in increased profits. In other words, CRM is a business strategy, enriched with technological solutions and organizational infrastructure, consisting in such customer management that as a result achieves long-term benefits. CRM requires the introduction of a customer-oriented company method of operation, ensuring effective marketing, sales and service processes. The general goal of an organization using the CRM principles (strategy) is to take care of the satisfaction, trust and retention as well as loyalty of profitable customers and to make the best possible use of their purchasing potential by appropriately shaping products and offers, saving customers' time on searching and reducing the costs of promotion and advertising of the company[16,17].

Sales management system or CRM (Customer Relationship Management) is a platform that can be used by sales managers to track data, reduce administrative tasks, and assign leads, and by salespeople to record daily activities and monitor goals. A huge advantage of this solution is that customer information is stored on the platform, which helps streamline sales and marketing collaboration. There are many CRM platforms available. An effective sales management system should help your company achieve or exceed long-term goals, especially when it is integrated with your communications system and allows you to seamlessly connect customer interaction information with the communications capabilities of your sales force.

Benefits of CRM system[18]:

1. Customer Data Management. CRM software makes the sales process easier by organizing all lead and customer information in one place and automating data entry.
2. Sales reporting. CRM tracks the value of potential and earned sales and monitors sales team activity such as emails sent, phone calls made, appointments booked, deals created and their status.
3. Accurate sales forecasting. The CRM system precisely displays the entire sales funnel, which facilitates sales revenue forecasting and increases the effectiveness of sales team management.
4. Customer segmentation. You can sort leads by parameters such as location, deal size, acquisition source, or deal close date to identify specific channels and activities that bring the most sales effectiveness.
5. Scaling the sales proces. A repeatable sales process is key to testing new sales activities and strategies. Without CRM information, you will always be shooting blindly. You need data to know what activities are effective and what trends are trending upwards.

[16] E. Rudawska, Lojalność klientów, PWE, Warszawa 2005.

[17] P. R. Nulman, Always say YES! - How to acquire and retain a customer, Studio EMKA, Warsaw 2004.

[18] Quote from: https://www.businessweb.pl/sprzedaz/co-to-jest-crm/.

The most common objectives of CRM systems include:
- Gaining knowledge about the client, i.e. getting to know and understand the client. This is done through skillful processing of information;
- Customer management, i.e. their appropriate segmentation, defining preferences and the ability to propose appropriate products and services;
- Customer retention, i.e. appropriate actions and policies of individual company departments.

Dedicated subsystems have been developed to support the activities of individual company units, the most important of which are[19]:
- CRM customer service,
- CRM sales,
- CRM Marketing,
- CRM service,
- Internal CRM,
- CRM analysis,
- CRM customer service.

In one of the interviews with a leading manufacturer of CRM systems, we can read: "We deal with what we call "customer management". We enable organizations to use information and communication technologies to establish and maintain contacts with customers – from identifying them as potential interested parties and establishing actual cooperation to managing the entire life cycle of our product". Currently, there are dozens of companies operating on the CRM market that deal with writing applications for managing customer relationships. In the USA and in some countries of Western Europe, we can even talk about a kind of boom in Sales Force Automation (SFA) and Customer Relationship Management (CRM) software, which has grown up through the functional development of SFA. It is still a very young market, which does not have strict definitions and standards, such as MRP II or ERP. Even among software producers, there is no agreement on the scope of the term CRM[20,21,22,23,24]. SFA (Sales Force Automation) – using software to automate business sales tasks, including: order processing, contact/relationship management, information exchange, inventory control, order tracking, sales analysis and forecasting, sales team planning and control. Usually used in conjunction with CRM and ERP. SFA solutions support salespeople working remotely.

---

[19] P. Kontyka, R. Kornaś, Internet portal for automatic customer service of a selected company enabling customer relationship management, master's thesis, AGH, Kraków 2006.

[20] A. Grześkowiak, K. Mazurek-Lopacińska, M. Sobocińska, A. Stanimir, Marketing research methods. Modeling, technology, visualization, Wrocław University Publishing House, Wrocław 2016.

[21] A. Lotko, Customer Relationship Management. Strategies and Systems, Radom University of Technology Publishing House, Radom 2006.

[22] D. H. Maister, C. H. Green, R. M. Galford, Zaufany doradca. Jak budować trwałe relacje z klientami, Onepress, Warsaw 2011.

[23] A. Parvatiyar, Customer Relationship Management: Emerging Practice, Process and Discipline, „Journal of Economic and Social Research" 2011; 3(2): 1-34.

[24] W. Wereda, Zarządzanie relacjami z klientem (CRM) a postępowanie nabywców na rynku usług, Difin, Warsaw 2009.

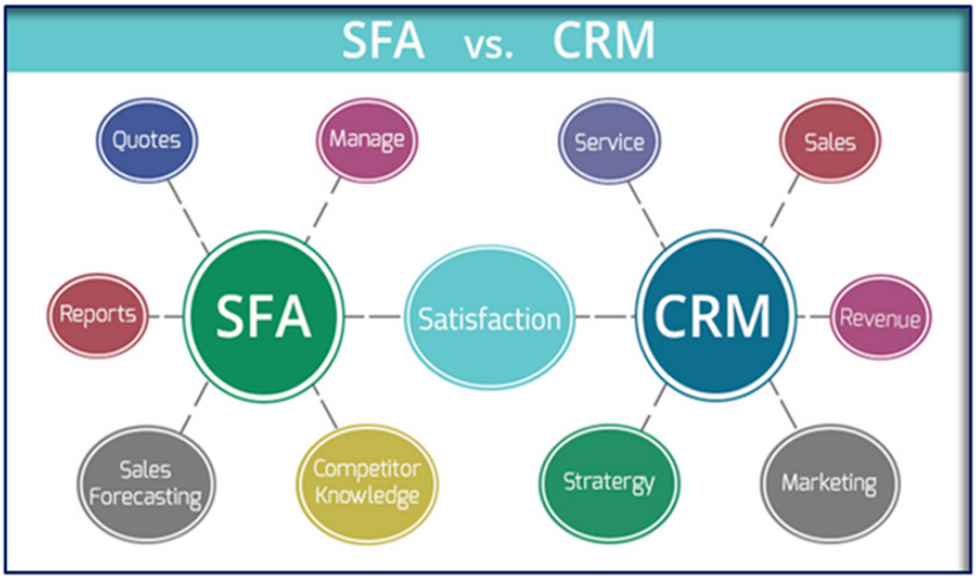


Figure 3. SFA vs. CRM
Source: http://adtubeindia1.blogspot.com/2018/07/crm-vs-sales-force-automation.html

Judging from the functions performed by the most popular CRM packages, also known as front office, it can be assumed that they usually enable the collection and processing of data concerning cooperation with the customer, sales conversations, orders, orders, activities of sales representatives and employees of departments in direct contact with the customer. These packages also include sales automation modules, order configuration and offer preparation systems, and finally marketing encyclopedias supporting sales representatives. These programs most often enable searching for relevant data, preparing sales analysis and forecasting, managing technical support departments and telephone customer service points, the so-called call centers[25].

Conclusions

The effects of using the CRM system in the process of managing product implementation and implementing the market expansion strategy:

– First: coordination of team activities. Sales management systems, especially those connected to a contact center system, coordinate the work and communication of departments throughout the company. All those involved have access to important customer information via the platform and can communicate directly

[25] Quoted from: http://pracezzarzadzania.atspace.eu/klient-pod-kontrola-czyli-systemy-crm/

with customers or use databases of potential customers. This eliminates the need for multiple meetings and promotes teamwork.

- Secondly: saving time. Using CRM, you can organize all your customer data so that it is easily accessible to every team member and streamline the sales process. A good platform will help you analyze the data by creating clear charts and reports.
- Third: automation and workflow. By working in the system, the sales team will be able to reduce many of the daily tedious tasks. Instead of entering data or sending more emails, the sales team can focus on selling, while the platform will automate these activities.
- Fourth: data monitoring. Without a system, managers may have difficulty tracking sales data. CRM provides up-to-date information on the status of each lead, so managers and team members can prioritize their activities and give each lead the attention it needs in a timely manner.
- Fifth: process optimization and more effective management of sales processes.

A sales management system can help sales teams optimize their sales processes so that no prospect is missed and no sales opportunity is overlooked.

The CRM system therefore fulfills three basic functions:

- First: Building Customer Relationships – mainly consists of matching products and services to customers' needs, as well as acquiring knowledge about them, in order to provide customers with the greatest possible convenience when making purchases in a given company. This function also includes a quick response to signals from tchem.
- Second: maximizing customer relationships – is focused on increasing the value of sales per customer. The CRM system enables activities such as:
  - cross selling – this is cross-selling, which involves selling customers products that are logically related to those they have already purchased;
  - up selling – this is enriched sales, which involves selling or persuading customers to buy a more expensive version of the products they are interested in.
- Third: maintaining customer relationships – consists of acquiring further knowledge about customers, thanks to which the possibilities of serving them will be increased, as well as developing new products, adapted to the current needs of consumers. It is also important to motivate employees appropriately, so that they make an effort to retain the customer.

Additionally, CRM systems enable automation of activities such as:

- sales personalization;
- communication with the customer, e.g. encouraging conversation, etc.;
- developing and implementing personalised advertising campaigns;
- preparing discounts for individual products or customers;
- determining the customer's purchasing capacity;
- predicting future consumer behavior.

The CRM system operates on the basis of three basic subsystems:

- Operational CRM (front office) – this database contains information about transactions and contracts of the sales and order type. It concerns customers, products, employees of the company and main market competitors. This subsystem is used in such areas as: customer service, marketing, order management, issuing bills and invoices.
- Analytical CRM (back office) – is responsible for the analytical part, and therefore analyzes and processes data on customers and their purchasing behavior. It allows for understanding customer needs based on information collected from the operational subsystem.
- Interactive (communication) CRM – it enables direct contact with customers using traditional and modern technologies, including e-mail, discussion groups, websites, telephone communication, call center, fax, etc.

The benefits of implementing CRM in an enterprise (both the concept and the IT system) include:

- customer loyalty and increased customer satisfaction,
- increasing the effectiveness of customer contact,
- increase in company revenues,
- direct increase in productivity,
- increasing profitability while reducing costs,
- reducing the costs of customer service, sales and promotion,
- improving the customer service process,
- increasing the company's profits by reducing investments in customers who, according to the analysis, are unprofitable and focusing on those who generate profits,
- the ability to precisely define the target group,
- competitiveness in relation to companies that do not use this type of strategy,
- improvement of business processes based on customer data analysis.

Advantages of the customer relationship building process

Accepting the theory of the need to establish relationships in business, one cannot ignore its sources. The idea of creating business relationships is to use the synergy effect between all groups of stakeholders in the sales process. Companies strive for a situation in which the result of cooperation will be greater than the sum of their individual actions using the same inputs. Close cooperation with partners aims to lead both parties to better results and a favorable return on investment in this relationship. Managers should remember that the company itself generates costs, and customers are a source of profit, which is why relationships with them are so important.

On the other hand, building lasting relationships requires additional effort and investment. At this point, we should return to questions about the essence of loyalty and consider what benefits flow to the seller from creating lasting relationships. Additionally, we should also consider what such cooperation would look like without

incurring additional costs for building loyal cooperation and leaving it in a purely transactional nature.

The basic premise that guides companies when establishing cooperation with each other is to gain a competitive advantage and a better position on the market[26]. It should be noted that building customer loyalty can sometimes not only be a factor in building a competitive advantage, but can also determine the survival of a company[27]. Winning together in the market is a general and broadly understood value for enterprises. It is realized through a number of benefits such as greater production and sales capabilities, as well as a wider scope of activities.

In the context of specific and measurable effects resulting from permanent cooperation, theories and models of measuring customer value are used, such as the Customer Lifetime Value indicator or the RFM model. The first one presents a model suitable for calculating nominal values and can support financial decisions, while the second one is a model based on the ranking method. Its name is an acronym derived from the words in English (Recency – "recentness", referring to current practice, Frequency – frequency, Monetary value – monetary value) which are also parameters for measuring the attractiveness of relationships and building a customer ranking based on them.[28].

RFM Modelis one of the marketing analysis tools used to segment customers based on their purchasing behavior in a given period. The RFM model includes the concepts[29]:

- Review – time elapsed since last purchase (e.g. short, medium, long);
- Frequency – frequency of purchases (e.g. occasional, regular, high);
- Monetary value – total value of purchases made (e.g. economical, average, high).

There are no strictly defined values in the RFM model. The manager decides what can be considered a high frequency of purchases, a high value of purchases or a short time since the last purchase. The RFM indicator will be the highest if a given customer often shops with us, the value of their transaction is high, and at the same time they made a purchase relatively recently (such people are often called Champions). In turn, people who use our offer very rarely and have not done so for a long time, and the value of their purchases is low, will be assigned a low RFM indicator. The greater your knowledge of the needs, behaviors and habits of customers, the more effectively you can reach them with your offer. Segmentation through the RMF model, i.e. assigning customers to appropriate groups based on an analysis of their shopping behavior, brings the company numerous benefits[30].

---

[26] D. Iacobucci, J. D. Hibbard, Toward an encompassing theory of business marketing relationships (BMRS) and interpersonal commercial relationships (ICRS): an empirical generalization, „Journal of Interactive Marketing" 1991; 13(3): 21.

[27] D. Stankiewicz, M. Juszczyk, Shaping relationships with customers, „Scientific Papers" 2010; 608: 48.

[28] J. Novo, Drilling Down - Turning Customer Data into Profits with a Spreadsheet, Booklocker. com Inc., Saint Petersburg 2004.

[29] Quote from: https://loyaltystarter.io/czym-jest-model-rfm/

[30] S. Skrzypek-Ahmed, L. Antonov, M. Maciaszczyk, K. Kmiotek, Economic conditions of international entrepreneurship-globalization and global business, „Journal of Modern Science" 2023; 54(5).

It allows you to get answers to the following questions:

- Who are our best and most loyal customers?
- Who has the potential to join the group of the most valuable customers?
- Which customers should we fight for in particular so that they do not give up on our offer?
- Which customers can we reach with engagement marketing campaigns?
- What sales and marketing strategies should be used for specific customer groups to maximize sales?

Based on our own RFM model settings, we can segment our customers. Then, for each segment, we apply different sales and marketing strategies. Examples:

- Champions – these are the best customers (they buy the most, spend the most and have been active recently). They should be rewarded appropriately and communicated with appropriately. These are the customers who, because they are the first to purchase our new products or services.
- Loyal Customers – customers who buy regularly and spend a lot. We use an up-selling strategy for them, we ask for product reviews and recommendations, we send free gifts.
- Promising – potential customers who have been active recently. Loyalty programs, small, personalized gifts, and direct phone calls work well for them.
- New Customers – new customers who deserve high-quality after-sales service, building direct relationships with them and using special offers to increase the frequency and value of purchases.
- Cold Leads – customers who have shown low potential and have been inactive for some time. To revive interest, send them personalized emails and SMS messages. You should diagnose their needs and expectations, it is worth educating them and making the process of making purchases easier.
- Need Attention – customers who need attention from the seller. It is worth using time-limited offers and product recommendations based on previous purchases.
- Shouldn't Lose – these are customers with very high potential who were our customers in the past but are now close to giving up. We can recapture their interest through special offers, surveys and direct conversations.
- Sleepers – potential customers who have been inactive for a long time. Reconnect with them by sending personalized emails and text messages.
- Lost – customers who have not used our offer for a long time. It is worth winning them back through personalized e-mail campaigns. If this does not bring results, this group should be omitted from marketing communications.

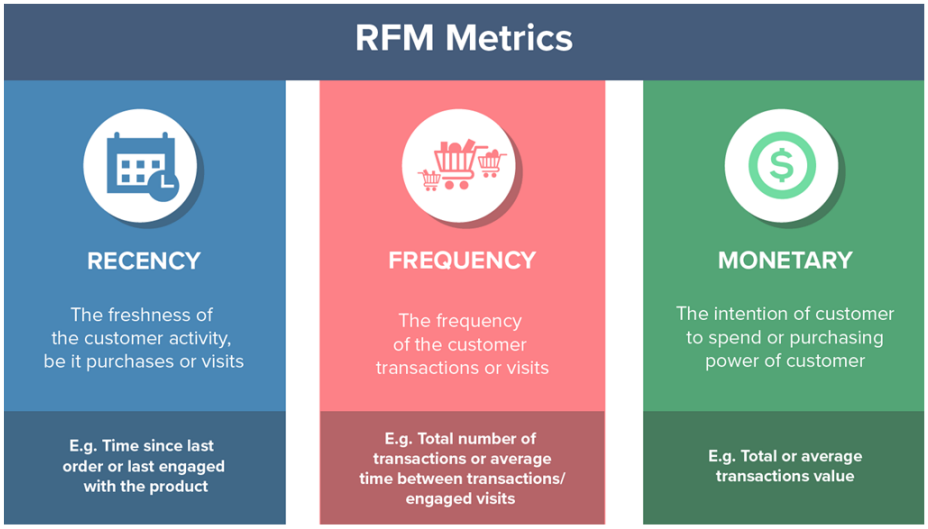


Figure 4. RFM Model
Source: https://clevertap.com/blog/rfm-analysis/

Bibliography

CRM-abc.pl Editorial Office – CRM-abc.pl – everything about CRM and Customer Relationship Management systems – CRM, http://www.crm-abc.pl/ (including subpages).

Dejnaka A., CRM – Zarządzanie kontaktami z klientami, Helion, Warszawa 2002.

Grześkowiak A., Mazurek-Lopacińska K., Sobocińska M., Stanimir A., Marketing research methods. Modeling, technology, visualization, Wrocław University Publishing House, Wrocław 2016.

Iacobucci D., Hibbard J. D., D. Toward an encompassing theory of business marketing relationships (BMRS) and interpersonal commercial relationships (ICRS): an empirical generalization, „Journal of Interactive Marketing" 1991; 13(3): 21.

Kontyka P., Kornaś R., Internetowy portal automatycznej obsługi klientów wybranej firmy umożliwiający zarządzanie relacjami z klientami, praca magisterska, AGH, Kraków 2006.

Kożusznik B., Human Behavior in an Organization, PWE, Warsaw 2002.

Kuc B. R., Moczydłowska J. M., Organizational Behavior, Difin, Warsaw 2009.

Lewin K., Group decision and social change [in:] Reading in social psychology, Newcomb T., Hartley E. (ed.), New York 1947.

Lotko A., Customer Relationship Management. Strategies and Systems, Radom Uni-

versity of Technology Publishing House, Radom 2006.

Maister D. H., Green C. H., Galford R. M., Zaufany doradca. Jak budować trwałe relacje z klientami, Onepress, Warszawa 2011.

Novo J., Drilling Down – Turning Customer Data into Profits with a Spreadsheet, Booklocker.com Inc., Saint Petersburg 2004.

Nulman P.R., Always say YES! - How to acquire and retain a customer, Studio EMKA, Warszawa 2004.

Parvatiyar A., Customer Relationship Management: Emerging Practice, Process and Discipline, „Journal of Economic and Social Research" 2011; 3(2): 1-34.

Potocki A., Zachowania organizacyjne. Wybrane zagadnienia, Difin, Warszawa 2005.

Rasiegel E., Friga P., The McKinsey Mind, KE Liber sc, Warsaw 2004.

Robbins S. P., Judge T. A., Zachowania w organizacji, PWE, Warszawa 2012.

Skrzypek-Ahmed S., Antonov L., Maciaszczyk M., Kmiotek K., Economic conditions of international entrepreneurship-globalization and global business, „Journal of Modern Science" 2023; 54(5).

Stankiewicz D., Juszczyk M., Shaping relationships with customers, „Scientific Papers" 2010; 608: 48.

Rudawska E., Lojalność klientów, PWE, Warszawa 2005.

Stabryła A.,Company development management, AE Publishing House in Krakow, Krakow 1996.

Stoner J., Wankel Ch., Management, PWE, Warsaw 2007.

Szaban J. M., Zachowania Organizacyjne. Aspekt międzykulturowy, Wydawnictwo Adam Marszałek, Toruń 2012.

Turner J. R., Kristoffer V., Thurloway L., The project manager as change agent. Proceedings of the 2002 Australian Institute of Project Management 2002.

Waterman R. H., Peters T. J., Phillips J. R., Structure is not Organization, The Mckinsey Quarterly Summer 1980.

Wereda W., Zarządzanie relacjami z klientem (CRM) a postępowanie nabywców na rynku usług, Difin, Warszawa 2009.

Wiącek-Janka E., Changes and conflicts in the organization, Poznań University of Technology Publishing House, Poznań 2006.

Wrzosek W., Strategie marketingowe, PWN, Warszawa 2012.

Zarębska A., Organizational changes in an enterprise: theory and practice, Difin, Warsaw 2002.

https://www.businessweb.pl/sprzedaz/co-to-jest-crm/

http://pracezzarzadzania.atspace.eu/klient-pod-kontrola-czyli-systemy-crm/

https://loyaltystarter.io/czym-jest-model-rfm/

https://clevertap.com/blog/rfm-analysis/

http://adtubeindia1.blogspot.com/2018/07/crm-vs-sales-force-automation.html

https://adaptivesag.com/pl/38-zarzadzanie-powiedzi-oraz-coaching.html

*Kostiantyn Pavlov**
*Olena Pavlova***
*Oleksandr Dluhopolskyi****
*Tetiana Ostapenko*****

THE CONCEPT OF NANOECONOMIC KNOWLEDGE IMPACT ON BUSINESS ENVIRONMENT IN UKRAINE

Koncepcja wpływu wiedzy nanoekonomicznej na środowisko biznesowe w Ukrainie

*Prof., Lesya Ukrainka Volyn National University, Ukraine, ORCID: 0000-0003-2583-9593
**Prof., Lesya Ukrainka Volyn National University, Ukraine, ORCID: 0000-0002-8696-5641
***Prof., West Ukrainian National University, Ukraine, ORCID: 0000-0002-2040-8762
****Dr., National Aviation University, Ukraine, ORCID: 0000-0003-2032-1365

Streszczenie

Artykuł porusza problematykę rozwoju nanogospodarczego na Ukrainie. W analizie zbadano korelację wskaźników ekonomicznych z edukacją, przedsiębiorczością i rozwojem badań. Istnieje wysoka odwrotna korelacja (0,844) pomiędzy nominalnym PKB a liczbą studentów, co sugeruje, że wraz ze wzrostem PKB spada liczba studentów na studiach ze względu na mniejszą liczbę uczelni. Bezpośrednia korelacja (0,702) pomiędzy PKB na mieszkańca a liczbą indywidualnych przedsiębiorców wskazuje, że wzrost przedsiębiorczości stymuluje wzrost gospodarczy. Nakłady na badania i rozwój (B+R) wykazują także umiarkowaną korelację (0,423) z wartością świadczonych usług, silną korelację (0,945) z produkcją przemysłową oraz istotną korelację (0,861) z produkcją rolną. Siła robocza, jako nośnik umiejętności ekonomicznych, odgrywa kluczową rolę w łączeniu nanoekonomii z szerszym wzrostem gospodarczym. Wzrost endogeniczny, napędzany działalnością indywidualną i małych przedsiębiorstw, jest niezbędny dla pozytywnego rozwoju gospodarki kraju.

Słowa kluczowe: *wiedza, nanoekonomia, Ukraina, otoczenie biznesowe, edukacja*

Summary

The article deals with the problem of nano-economic development in Ukraine. The analysis explores the correlation between the economic indicators and education, entrepreneurship, and research development. A high inverse correlation (0,844) exists between nominal GDP and the number of university students, suggesting that as GDP

grows, university enrollment declines due to the reduced numbers of institutions. A direct correlation (0,702) between GDP per capita and the number of individual entrepreneurs indicates that increased entrepreneurship stimulates economic growth. Research and development (R&D) expenditures also show a moderate correlation (0,423) with the value of services provided, a strong correlation (0,945) with industrial production, and a significant correlation (0,861) with agricultural output. The labor force, as a carrier of economic skills, plays a critical role in linking nano-economics with broader economic growth. Endogenous growth, driven by individual and small business activities, is essential for the positive development of a country's economy.

Key words: knowledge, nano-economics, Ukraine, business environment, education

Introduction

The agenda and the actualization of individual macro- and microeconomic processes often take place under the influence of a subjective personal factor. The leader of such a rise is "nano-economy", which is understood as an integral part of the economy in general, the productive force of which are individuals who, in the process of learning and activity, acquire skills of economic behavior, make optimal management decisions and, through the use of nanotechnology, ensure the achievement of high levels of competitiveness and spreading the experience of its acquisition in the economic environment[1,2,3].

The macroeconomic environment is characterized by economic growth and the process of social reproduction, which are the factors of macroeconomic dynamics[4,5]. The impact of the nano-economy at various levels of the economy occurs mainly through the impact on consumption, savings, and investment[6,7,8]. Economic

[1] T. Ostapenko, Nanoeconomics: dominants and development dynamics in a global environment: monograph, Autograph, Kyiv 2019.

[2] T. Ostapenko, Nano-innovative processes in modern social and economic systems. Actual issues of modern development of socio-economic systems in terms of the COVID-19 pandemic: scientific monograph, VUZF University of Finance, Business and Entrepreneurship, VUZF Publishing House St. Grigorii Bogoslov, Sofia 2021.

[3] T. Ostapenko, M. Kolesnyk, Nanoeconomics and innovative marketing as factors of sustainable development in global environment, "Baltic Journal of Economic Studies" 2021; 7(3): 159-167.

[4] K. Pavlov et all, Economic Diagnostics and Management of Eco-Innovations: Conceptual Model of Taxonomic Analysis, "Intelligent Human Systems Integration" 2021; 573–579.

[5] O. Pavlova, Yu. Nahaichuk, Decentralization reform in Ukraine, "Economic Journal of Lesya Ukrainka Volyn National University" 2020; 3(23): 23-31.

[6] Deloite Global, Deloite Review. Online: www.deloite.com/global/on/pages.

[7] T. Ostapenko, I. Britchenko, V. Marchenko , Definition of conceptual basics of nanoeconomics of inclusive society environment, "Eastern-European Journal of Enterprise Technologies" 2021; 5/13(113): 34-43.

[8] M. Kichurchak, Evaluation of cultural sphere development in the European Union countries as a factor of forming social capital and creative industries: experience for Ukraine, "Economic Annals-XXI" 2020; 184(7-8): 68-78.

equilibrium is ensured through the ratio of supply and demand, production, and consumption. Thus, by influencing the supply, the nano-economy becomes a determinant of the labor force as a factor of production, and by influencing the demand, the nano-economy becomes an expression of the consumer function for which households are responsible[9]. The nano-economy also consistently affects various sectors of the national economy (agriculture, industry, services, etc.) due to the tendency of individuals to find those areas where the income is higher, and the return on investment is the greatest.

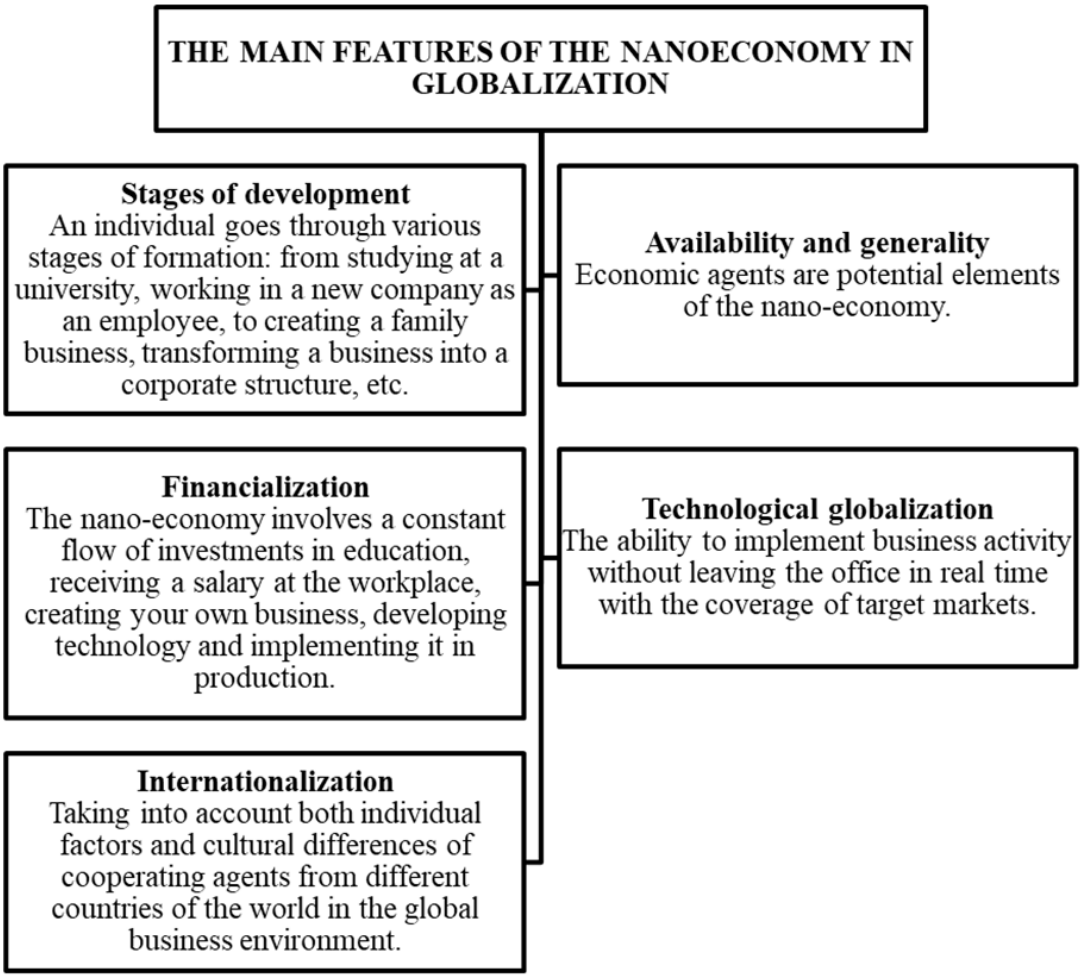


Figure 1. Characteristic features of the nano-economy under the conditions of globalization

Source: compiled by the authors

[9] T. Ostapenko, M. Kolesnyk, Nanoeconomics… op. cit.

Literature review

The question of the influence of nano-economics on the macroeconomic development has practically not been addressed in the scientific literature. It is evident that a considerable corpus of literature exists on the subject of qualitative changes in the national economy, particularly in relation to the influence of human capital. Thus, some authors analyze the development of the national economy in the context of the COVID-19 pandemic and claim that the crisis should become a new platform for the evolution of both developed and developing economies[10]. In this context, the individual factor of development acquires special importance, appealing to the influence of individual policymakers on how different countries of the world overcome the consequences of the pandemic.

Some scientists note that the socio-economic development depends on the formation of a certain management mechanism within households[11], which affect the intensification and optimization of economic relations in different countries. The household economy is gradually becoming the center and source of growth in national economic systems.

The advancement of the national economy is also significantly influenced by the cultural factor of the nano-economy. Scientists[12] prove that the economy, as a cultural phenomenon, has a synergistic effect on the advancement of the national economies to the highly developed stages of industrial development (Industry 4.0-5.0) and on the development of the noosphere in general. Intellectual capital becomes a guarantee of the intensification of cultural phenomena at various levels of the economic system.

Economic growth in developed and developing economies under the influence of export concentration and diversification is analyzed in the works of various scientists[13]. Today, the circumstances of export concentration and diversification affect the exit of developing countries from the crisis state. Developed countries should operate in these categories in order to improve their own economic condition (the influence of nano-economics on international trade conditions of development).

The educational factor in the progress of the information economy is also of particular importance for the development of economic systems[14,15,16].

[10] O. Chirva, A. Chirva, N. Malyarchuk, Formation of the mechanism of socio-economic development in Ukraine, "Baltic Journal of Economic Studies" 2021; 7(5): 213-220.

[11] P. Kutsyk, B. Shevchyk, O. Perepolkina, Economies as culture: synergy of advanced development, "Baltic Journal of Economic Studies" 2021; 7(1): 243-249.

[12] V. Dergachova, A. Dunska, V. Holiuk, I. Lutsenko, M. Pichugina, Export concentration and diversification: impact on economic growth in the developed and developing countries of the world, "Economic Annals-XXI" 2021; 192(21): 26-37.

[13] A. Djakona, N. Kholiavko, M. Dubyna, A. Zhavoronok, M. Fedyshyn, Educational dominant of the information economy development: a case of Latvia for Ukraine, "Economic Annals-XXI" 2021; 192(2): 108-124.

[14] M. Malnyk, S. Shchehliuk, I. Leshchukh, O. Litorovych, Digitalization of the economies of Ukraine and Poland: national and local dimensions, "Economic Annals-XXI" 2021; 191(1): 30-42.

[15] O. Sazonets, V. Nykonchuk, A. Kozakevych, The influence of intulectional capital and innovations of the economic development of the world and national economy, "Economic Annals – XXI" 2021; 190(2): 23-32.

[16] L. Syhyda, L. Saher, M. Gąsior, N. Sygyda, N. Artyukhova, S. Skrzypek-Ahmed, O. Dluhopolskyi, R. Rehak, Investigating the Role of Innovation in Inclusive and Sustainable Development in Ukraine and South Korea, "Sustainability" 2023; 15: 11195.

The digitalization of diverse services also represents a source of economic progress[17,18].

Methods

The purpose of this study is to determine the conceptual foundations of the impact of nano-economic knowledge on the business environment in Ukraine.

Correlation analysis is applied in the article to determine the vectors of influence of nano-economics on various spheres of socio-economic development. All calculations of correlation coefficients are performed using the Stats package.

Results

First, there is the correlation between the GDP indicator and the number of university students. Such an indicator reflects the state of development of the baby-economy in the country, which is an integral component of the nano-economy. Table 1 shows the data used to calculate the correlation between nominal GDP and the number of university students in Ukraine.

Table 1. Nominal GDP and the number of students of higher education institutions in Ukraine

Indicator	Year					
	2017	2018	2019	2020	2021	2022
Nominal GDP (million USD)	96096	116520	131318	157721	151960	205247
Number of students of HEIs (persons)	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
	1369432	1329964	1322324	1266121	1141889	1046669

Source: systematized by the authors based on (State Statistics Service of Ukraine, 2023)

Figure 2 illustrates the correlation between the data presented in table 1, which is represented by a descending straight line. This demonstrates the inverse relationship between the data.

[17] T. Ostapenko, I. Britchenko, P. Lošonczi, S. Matveiev, Identification of regularities in the development of the babyeconomy as a component of the nanolevel of economic system, "Eastern-European Journal of Enterprise Technologies" 2022; 13(115): 92-102.

[18] V. Okulich-Kazarin, A. Artyukhov, Ł. Skowron, N. Artyukhova, O. Dluhopolskyi, W. Cwynar, Sustainability of Higher Education: Study of Student Opinions about the Possibility of Replacing Teachers with AI Technologies, "Sustainability" 2024; 16(55).

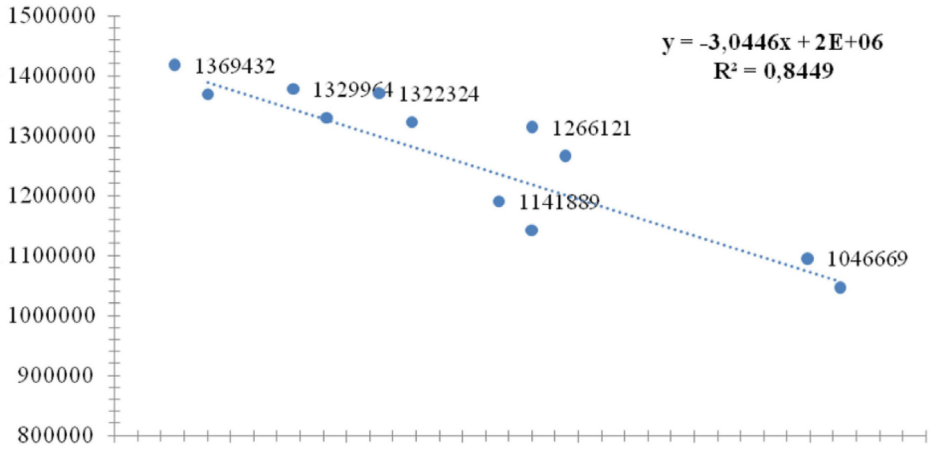


Figure 2. Correlation between nominal GDP and the number of students of higher education institutions in Ukraine

Source: compiled by the authors
**Vertical: number of students in higher education institutions, persons; Horizontal: number of students: Nominal GDP, million USD*

The correlation coefficient is equal to 0,844, which indicates a close relationship between the values, however, there is an inverse relationship between the growth of GDP and the number of university students, with the latter decreasing as the former increases. The obtained data can be explained by the fact that the number of universities is decreasing compared to the 1990s and the beginning of the 2000s. Accordingly, the number of students decreases, as the universities which cannot withstand competition on the education market cease to exist.

Let us calculate the correlation coefficient between the GDP per capita indicator and the number of individual entrepreneurs. This will provide insight into the relationship between the macroeconomic state of the economy and its individual development indicator. The initial data for calculating the correlation coefficient are given in the table 2.

Table 2. GDP per person and the number of individual entrepreneurs

Indicator	Year					
	2017	2018	2019	2020	2021	2022
GDP per capita (million USD)	2251	2743	3107	3754	3639	4959
Number of individual entrepreneurs (units)	2016	2017	2018	2019	2020	2021
	1559161	1466803	1483716	1561028	1599755	1983269

Source: systematized by the authors based on (State Statistics Service of Ukraine, 2023)

The graph of the dependence of the determined indicators is depicted in fig. 3. The correlation coefficient between GDP per capita and the number of individual entrepreneurs is 0,702. This indicates that the correlation between the analyzed data is rather dense and direct because the greater the number of individual entrepreneurs is, the more intensively the GDP per capita grows. Thus, it can be stated that the nano-economy actively affects the development of macroeconomic development and the formation of market equilibrium.

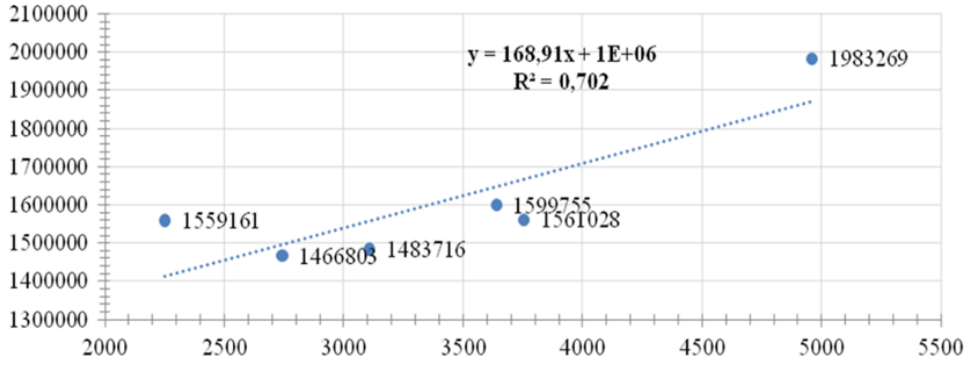


Figure 3. Correlation between GDP per capita and the number of individual entrepreneurs in Ukraine

Source: compiled by the authors

**Vertical: number of individual entrepreneurs, units; Horizontal: GDP per capita, million USD*

An illustration of the impact of the innovation system on the volume of services provided is given in the table 3 and fig. 4. Table 3 shows the volumes of services provided and the associated costs for research and development (R&D). The data demonstrates that the moderately growing dynamics are reflected.

Table 3. The value of the services provided and the amount of R&D expenses

Indicator	Year					
	2017	2018	2019	2020	2021	2022
Value of provided services (thousands USD)	Lack of data	7100128	7989912	9498686	9572315	12799667
Volumes of R&D expenditures (million USD)	2016	2017	2018	2019	2020	2021
	465	523	619	685	617	Lack of data

Source: systematized by the authors based on (State Statistics Service of Ukraine, 2023)

The correlation coefficient between the volumes of implemented services and the costs of the scientific research and development is 0,423. This is a moderate direct dependence that shows that with the increase in spending on science, the amount of services provided increases.

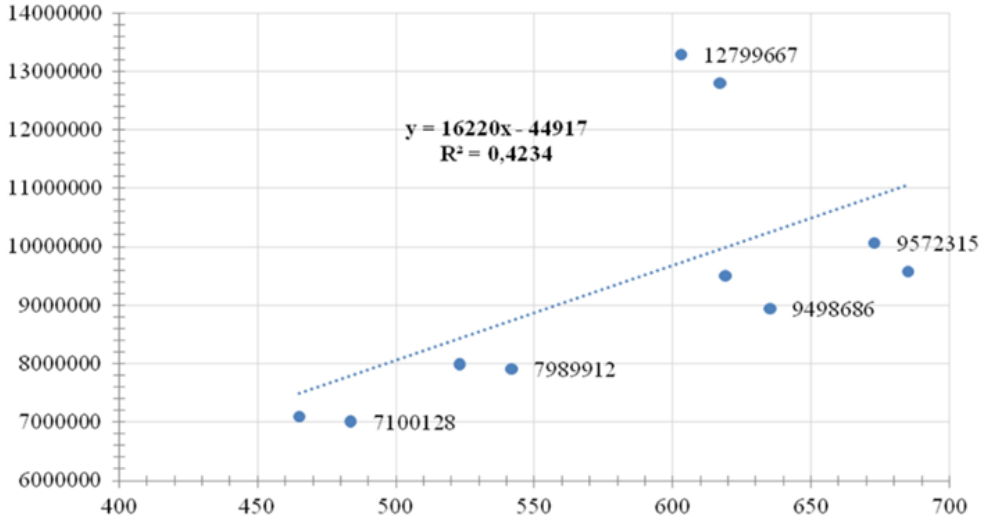


Figure 4. Correlation between the volume of implemented services and the costs of scientific research & development

Source: compiled by the authors
**Vertical: value of services rendered, thousand USD; Horizontal: volume of research and development expenses, million USD*

The correlation coefficient between the volume of industrial production and the costs of scientific research and development in Ukraine are also to be calculated (the initial data are presented in table 4).

Table 4. The volumes of industrial production and expenditures on scientific research & development

Indicator	Year					
	2017	2018	2019	2020	2021	2022
Volume of sold industrial products (million USD)	71254	84103	92568	98445	89897	134939
R&D expenditures (million USD)	2016	2017	2018	2019	2020	2021
	465	523	619	685	617	Lack of data.

Source: systematized by the authors based on (State Statistics Service of Ukraine, 2023)

From the table 4, one can observe that the volumes of industrial production and research and development costs are increasing from year to year, and the correlation coefficient is 0,945 (fig. 5). Such a high correlation coefficient indicates that the influence of nano-economics on macroeconomics is significant and direct.

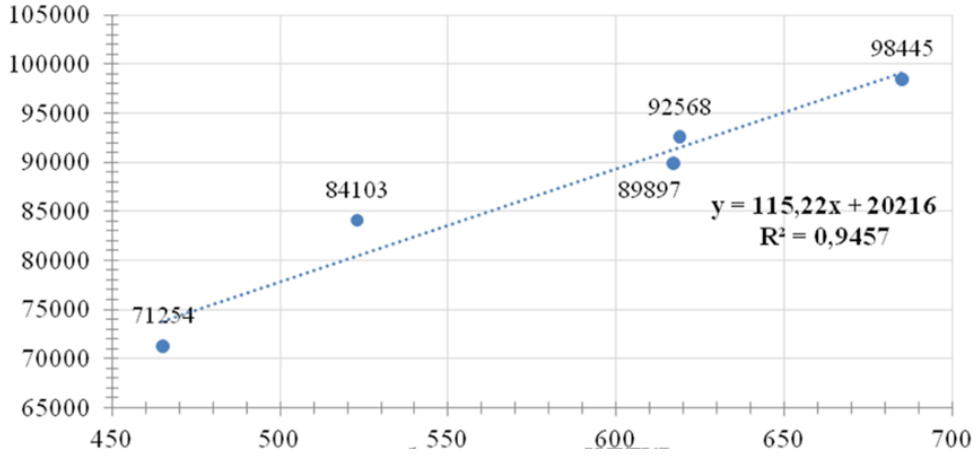


Figure 5. Correlational between the volumes of realized industrial products and expenditures on scientific research & development

Source: compiled by the authors
**Vertical: volumes of industrial products sold, million USD; Horizontal: volume of research and development expenses, million USD*

Table 5 provides the initial data for the analysis of the impact of the scientific and technological progress on the development of the agricultural sector in Ukraine.

Table 5. The volumes of agricultural products and expenditures on scientific research and development

Indicator	Year					
	2017	2018	2019	2020	2021	2022
Volume of agricultural, forest and fishery products sold (thousands of USD)	16725803	18267037	19944995	22728106	22611237	26839708
R&D expenditures (million USD)	2016	2017	2018	2019	2020	2021
	465	523	619	685	617	Lack of data

Source: systematized by the authors based on (State Statistics Service of Ukraine, 2023)

The indicators given in table 5 testify to the growing dynamics and the correlation coefficient shows a close relationship (fig. 6). The correlation coefficient is 0,861. Thus, with the growth of scientific expenses, the production and sale of agricultural goods increases. Nano-economy as an innovative economy also affects the formation of the agricultural sector in different countries of the world.

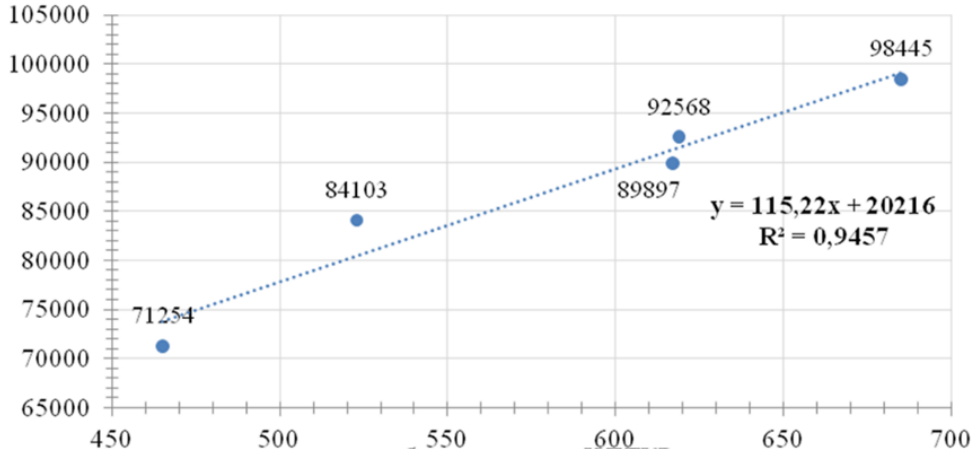


Figure 6. Correlational between the indicators of the volume of agricultural, forestry and fishery products sold and expenditures on scientific research & development

Source: compiled by the authors
**Vertical: volume of agricultural, forestry and fishery products sold, thousand USD; Horizontal: volume of research and development expenses, million USD*

The obtained results regarding the impact of nano-economics on the macroeconomic environment can be explained by the following:

- the impact of nano-economics on the process of the economic growth is determined by the gradual impact on the process of social extended reproduction. The scheme "production – distribution – exchange – consumption" is complemented by the innovative component "idea – research – implementation" and the component of technological knowledge;
- the influence of nano-economics on the macroeconomic level of management and economic balance occurs through the influence on the market mechanism of the ratio of supply and demand, production and consumption;
- the impact of the nano-economy on the service, industrial and agricultural sectors is a result of the recent trend towards individualizing production and management processes within the economic system;
- the correlation analysis made it possible to determine mathematically how the nano-economy affects the development of the national economic system.

Discussion

The factor connecting the nano-economy with social reproduction is the labor force because the main subject of the nano-economy is an individual. The reproduction of the labor force is related to the restoration of the workers' capacity to perform their jobs. The labor force is a carrier of economic skills and competences, which its representatives exchange for wages that are spent on a decent existence. Labor is the supply side of the nano-economy.

Within the framework of the nano-economy, there is an exchange of activity results whereby some specialists complement the actions of the others. It is not viable in today's business environment for different departments to operate in isolation, each performing its own specific functions. Engineers should link their work with economists and psychologists to obtain a synergistic effect from such joint activity. The exchange stage of the production process is where goods and services are exchanged based on the division of labor. Through exchange, participants in the production process receive their share of national wealth due to distribution. As a result of the exchange, a single person participates in the formation of GDP[19,20,21].

[19] D.M. Kreps, Course in Microeconomic Theory, Princeton University Press, Princeton, New Jersey 1990.

[20] J. Tinbergen, A. Dolman, J. van Ettinger, RIO, Reshaping the International Order: A Report to the Club of Rome. Dutton, New-York 1976.

[21] R.J. Shiller, Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends?, "American Economic Review" 1981; 71: 421-436.

For the positive development of the country's economy, there must be endogenous growth[22]. The internal impetus for the development of the economic system at the macro level arises as a consequence of the development of the nano-economy. A country with a strong family business system (for example, Italy) develops the household as an impetus to the formation of industry-territorial clusters within the national economy. Countries such as the United States and the United Kingdom have an individualistic approach to business, where it is more probable that the formation of well-being and its growth depends on the individual employee rather than on their immediate group.

Conclusions

The household economy represents the primary link in the nano-economy and serves as the main conduit for the country's economic activity. Individual consumption, which originates within households, is the fundamental driver of this economy. In modern conditions, households largely shape the macroeconomic indicators of business. It is in this nano-economic component that dependence on indicators of the development of the national economy is formed. As the correlation analysis shows, the relationship between GDP per capita and the number of individuals is strong, which confirms the opinion about the active influence of the nano-economy on macroeconomic management. Furthermore, the significant relationship between the indicators of the sales of industrial and agricultural products and expenditures on R&D suggest the potential for an innovator to influence the development of various sectors of the national economy.

Bibliography

Chirva O., Chirva A., Malyarchuk N., Formation of the mechanism of socio-economic development in Ukraine, "Baltic Journal of Economic Studies" 2021; 7(5): 213-220.

Deloite Global, Deloite Review. Online: www.deloite.com/global/on/pages.

Dergachova V., Dunska A., Holiuk V., Lutsenko I., Pichugina M., Export concentration and diversification: impact on economic growth in the developed and developing countries of the world, "Economic Annals-XXI" 2021; 192(21): 26-37.

Djakona A., Kholiavko N., Dubyna M., Zhavoronok A., Fedyshyn M., Educational dominant of the information economy development: a case of Latvia for Ukraine, "Economic Annals-XXI" 2021; 192(2): 108-124.

[22] O. Skrynnyk, Prediction of Convergent and Divergent Determinants of Organisational Development, "Business Ethics and Leadership" 2023; 7(1): 74-81.

Kichurchak M., Evaluation of cultural sphere development in the European Union countries as a factor of forming social capital and creative industries: experience for Ukraine, "Economic Annals-XXI" 2020; 184(7-8): 68-78.

Kreps D.M., Course in Microeconomic Theory, Princeton University Press, Princeton, New Jersey 1990.

Kutsyk P., Shevchyk B., Perepolkina O., Economies as culture: synergy of advanced development, "Baltic Journal of Economic Studies" 2021; 7(1): 243-249.

Malnyk M., Shchehliuk S., Leshchukh I., Litorovych O., Digitalization of the economies of Ukraine and Poland: national and local dimensions, "Economic Annals-XXI" 2021; 191(1): 30-42.

Okulich-Kazarin V., Artyukhov A., Skowron Ł., Artyukhova N., Dluhopolskyi O., Cwynar W., Sustainability of Higher Education: Study of Student Opinions about the Possibility of Replacing Teachers with AI Technologies, "Sustainability" 2024; 16(55).

Ostapenko T., Nano-innovative processes in modern social and economic systems. Actual issues of modern development of socio-economic systems in terms of the COVID-19 pandemic: scientific monograph, VUZF University of Finance, Business and Entrepreneurship, VUZF Publishing House St. Grigorii Bogoslov, Sofia 2021.

Ostapenko T., Britchenko I., Lošonczi P., Matveiev S., Identification of regularities in the development of the babyeconomy as a component of the nanolevel of economic system, "Eastern-European Journal of Enterprise Technologies" 2022; 13(115): 92-102.

Ostapenko T., Britchenko I., Marchenko V., Definition of conceptual basics of nanoeconomics of inclusive society environment, "Eastern-European Journal of Enterprise Technologies" 2021; 5/13(113): 34-43.

Ostapenko T., Kolesnyk M., Nanoeconomics and innovative marketing as factors of sustainable development in global environment, "Baltic Journal of Economic Studies" 2021; 7(3): 159-167.

Ostapenko T., Nanoeconomics: dominants and development dynamics in a global environment: monograph, Autograph, Kyiv 2019.

Pavlov K. et all, Economic Diagnostics and Management of Eco-Innovations: Conceptual Model of Taxonomic Analysis, "Intelligent Human Systems Integration" 2021; 573–579.

Pavlova O., Nahaichuk Yu., Decentralization reform in Ukraine, "Economic Journal of Lesya Ukrainka Volyn National University" 2020; 3(23): 23-31.

Tinbergen J., Dolman A., van Ettinger J., RIO, Reshaping the International Order: A Report to the Club of Rome. Dutton, New-York 1976.

Sazonets O., Nykonchuk V., Kozakevych A., The influence of intulectional capital and innovations of the economic development of the world and national economy, "Economic Annals – XXI" 2021; 190(2): 23-32.

Shiller R.J., Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends?, "American Economic Review" 1981; 71: 421-436.

Skrynnyk O., Prediction of Convergent and Divergent Determinants of Organisational Development, "Business Ethics and Leadership" 2023; 7(1): 74-81.

State Statistics Service of Ukraine. Online: www.ukrstat.gov.ua.

Syhyda L., Saher L., Gąsior M., Sygyda N., Artyukhova N., Skrzypek-Ahmed S., Dluhopolskyi O., Rehak R., Investigating the Role of Innovation in Inclusive and Sustainable Development in Ukraine and South Korea, "Sustainability" 2023; 15: 11195.

*Larysa Yushchyshyna**

ENERGY MANAGEMENT - ITS STATE AND PROSPECTS OF DEVELOPMENT IN UKRAINE

Zarządzanie energią – stan i perspektywy rozwoju na Ukrainie

*PhD. in Economics, Assoc. Prof., Department of Management, Lesya Ukrainka Volyn National University, Lutsk, Ukraine

Streszczenie

Artykuł poświęcony jest badaniu stanu i perspektyw rozwoju zarządzania energetycznego w Ukrainie, której system energetyczny od dłuższego czasu znajduje się pod zmasowanym atakiem ze strony Rosji. Przeanalizowano straty poniesione przez sektor energetyczny Ukrainy w wyniku rosyjskiej inwazji na pełną skalę. Ustalono, że w obecnych warunkach system energetyczny Ukrainy nie jest w stanie funkcjonować tak stabilnie, jak przed wojną. Omówiono rolę, znaczenie i zadania zarządzania energetycznego w odbudowie i rozwoju sektora energetycznego kraju. Uzasadniono stopniowe tworzenie systemu zarządzania energetycznego na trzech poziomach rozwoju. Zbadano aktualny stan zarządzania energetycznego w ukraińskich miastach i zjednoczonych wspólnotach terytorialnych. W artykule przedstawiono wyzwania i możliwości, z jakimi borykają się organizacje podczas wdrażania systemu zarządzania energetycznego. Przedstawiono propozycje możliwych rozwiązań problemów wskazanych w analizie. Podkreślono znaczenie strategicznych inwestycji w energetykę odnawialną i współpracę międzynarodową na rzecz wsparcia bezpieczeństwa energetycznego i wzrostu gospodarczego Ukrainy. Zwrócono uwagę na konieczność reformy polityki energetycznej, aby dostosować ją do nowych wyzwań, co przyczyni się do zrównoważonego rozwoju infrastruktury i wzmocnienia relacji partnerskich z międzynarodowymi darczyńcami i inwestorami.

Słowa kluczowe: *zarządzanie energetyczne, system zarządzania energetycznego, monitoring energetyczny, efektywność energetyczna*

Summary

The article is dedicated to the research of the current state and development prospects of energy management in Ukraine, whose energy system has been subjected to massive attack by the Russian Federation for an extended period. It analyzes the damage inflicted on Ukraine's energy sector by the Russian full-scale invasion. It has been established that, in the context of the ongoing conflict, Ukraine's energy system

is unable to operate at the same level of stability as it did prior to the war. The role, its significance, and the tasks of energy management in the recovery and development of the country's energy sector are elucidated. The article justifies a step-by-step approach to forming the energy management system across three levels of development. It examines the current state of energy management in Ukrainian cities and amalgamated territorial communities. The article highlights the challenges and opportunities the organizations face when implementing energy management systems. It offers suggestions for potential solutions to the problems identified in the analysis. The importance of strategic investments in the renewable energy and international cooperation for the purpose of supporting energy security and economic growth in Ukraine is emphasized. The necessity of reforming the energy policy to accommodate the emerging challenges is highlighted, which will contribute to sustainable infrastructure development and strengthen the partnerships with international donors and investors.

Key words: energy management, energy management system, energy monitoring, energy efficiency

Introduction

In the context of Russia's military aggression, the energy management system in Ukraine is a crucial aspect for ensuring the stability and the effectiveness of the country's energy sector.

Its functioning, development, and improvement require a comprehensive approach and coordinated efforts from all stakeholders, including government bodies, businesses, non-governmental organizations, and citizens. To achieve success in this area, it is essential to implement modern technologies and energy management practices, promote the development of the renewable energy sources, reduce the energy losses, and enhance energy efficiency. Furthermore, it is important to ensure transparency and openness in decision-making and create favorable conditions for investment in the energy sector.

Analysis of the damage from Russian aggression in Ukraine's energy sector

Energy efficiency and a resource-conserving approach have always been crucial for Ukrainians, and they are particularly significant during the ongoing war. The energy infrastructure in Ukraine has been under targeted attack from the enemy for an extended period of time. As a result of these strikes, a significant portion of the power generating facilities have been rendered inoperative. Over 50% of Ukraine's energy infrastructure has been affected by Russian shelling.

According to the KSE Institute, the analytical center at the Kyiv School of Economics, as of early 2024, the direct damages inflicted on Ukraine's energy sector

amounted to $9 billion[1]. Following the public statements made by the Prime Minister of Ukraine after the massive attack in March 2024, 80% of thermal power plant units were damaged. The total damages to the energy sector reached $12,5 billion[2].

The sector suffering the most is the electricity generation and transmission (figure 1). The estimated total damages for these assets exceed $7,4 billion[3].

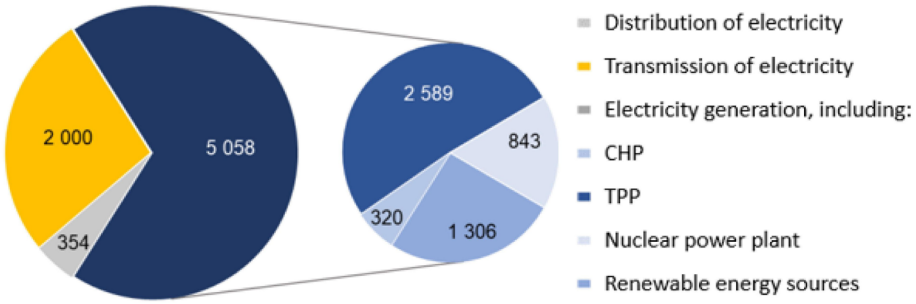


Figure 1. Direct infrastructure damage to power generation facilities, million USD
Source: data from the Ministry of Energy of Ukraine, Official portal of the Ministry of Energy of Ukraine. Online: https://mev.gov.ua/

A significant portion of the damage has affected large power generation facilities. During one of the massive missile strikes in the 2022-2023 heating season, according to the Prime Minister of Ukraine, 9 thermal power plant units were damaged, and at least one was completely destroyed due to a direct missile hit[4]. Overall, current direct damages to thermal power generation are estimated at $2,6 billion for thermal power plants (TPP) and $320 million for combined heat and power plants (CHP). Direct damages to hydroelectric power plants and pumped storage power plants (PSPP) are estimated at $1,1 billion[5].

Producers of renewable energy (RES) have also suffered significant losses. According to the Energy Charter Secretariat, 13% of solar generation capacity is located in occupied territories, and 8% has been damaged or destroyed; approximately 80% of wind generation is situated in areas under occupation, with part of it damaged due to shelling; 2% of bioenergy facilities are under occupation, and at least 4 biogas plants are known to have been destroyed (figure 2)[6].

---

[1] KSE Institute, Report on Direct Infrastructure Damage Due to the Russian Military Aggression Against Ukraine as of Early 2024. Online: https://kse.ua/wp-content/uploads/2024/04/01.01.24_Damages_Report.pdf.

[2] Russian Attacks Destroyed 80% of Thermal Generation in Ukraine, Radio Svoboda, April 5, 2024. Online: https://www.radiosvoboda.org/a/news-enerhetyka-shmyhal-udary-rosiyi/32892560.html.

[3] Official portal of the Ministry of Energy of Ukraine. Online: https://mev.gov.ua/.

[4] Russian Attacks Destroyed 80% of Thermal Generation in Ukraine… op. cit.

[5] Official portal of the Ministry of Energy… op. cit.

[6] KSE Institute, Report on Direct Infrastructure Damage... op. cit.

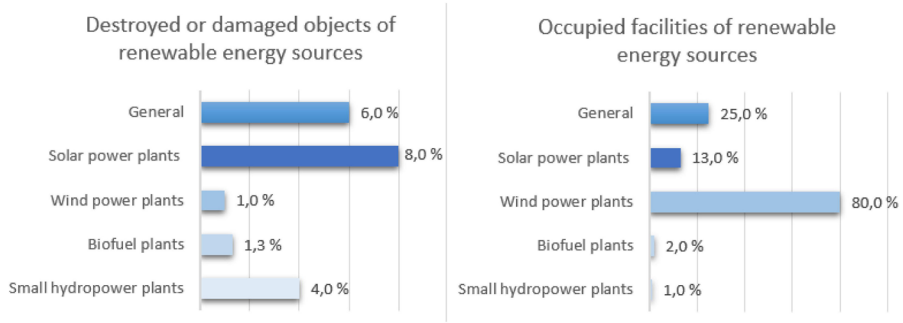


Figure 2. Destroyed, damaged and occupied renewable energy facilities as of January 2024

Source: Energy Charter International based on KSE Institute, Report on Direct Infrastructure Damage Due to the Russian Military Aggression Against Ukraine as of Early 2024. Online: https://kse.ua/wp-content/uploads/2024/04/01.01.24_Damages_Report.pdf

The KSE Institute team estimates the direct damages to the renewable energy producers (excluding large hydropower plants and pumped storage plants) at $220 million[7]. This sector is also experiencing significant indirect financial losses (table 1).

Table 1. The assessment of direct losses to Ukraine's energy sector due to the war as of January 2024

Sector	Assessment of losses, $ billion
Electric Power Industry, including:	7,41
Electricity Generation, including:	5,06
TPP	2,59
CHP	0,32
NPP	0,84
RES	1,31
Electricity Transmission	2,00
Electricity Distribution	0,35
Oil and Gas Sector, including:	1,20
Gas Transportation	0,78
Gas Distribution	0,15
Oil and Petroleum Storage	0,27
Coal Mining Industry	0,41
Total Direct Infrastructure Damage	9,0

Source: Kyiv School of Economics, based on data from the Ministry of Energy of Ukraine, energy companies, and open data KSE Institute, Report on Direct Infrastructure Damage... op. cit.

[7] Ibidem.

The ongoing active hostilities across a considerable portion of Ukraine, coupled with the targeted extensive shelling by the Russian Federation, have resulted in significant damage and destruction to the country's electricity transmission and distribution infrastructure. Preliminary estimates indicate that the direct damages to the electricity transmission system operator amount to over $2 billion, while the distribution system operators have incurred damages exceeding $350 million[8].

Since the first days of the full-scale Russian invasion, targeted attacks have been directed at oil and petroleum storage and processing facilities. Since February 24, 2022, at least thirty-two oil depots of various sizes and modernization levels, as well as the fuel stored at these facilities, have been damaged or completely destroyed. Current estimates indicate that the direct damages to the fuel storage sector amount to nearly $266 million[9].

Assessing the current situation is challenging due to the lack of precise information on damage to facilities that are under occupation or inaccessible due to the ongoing shelling and the risks of landmines.

Under these conditions, Ukraine's energy system is unable to maintain the same degree of stability as it did before the war. Therefore, all consumers, including both the public and the businesses, must adopt a conscious approach to energy consumption. The energy war that Russia is waging against Ukraine has highlighted the urgent need to accelerate the implementation of an energy management system for the restoration and economic development of Ukraine.

Implementation of energy management systems in Ukraine

The path to energy efficiency begins with energy management, i.e. a practice aimed at ensuring the rational use of fuel and energy resources within an enterprise or municipality, which significantly optimizes the energy consumption.

The energy management system (EMS) is a part of a broader management system that includes a set of measures designed to conserve the energy resources. This primarily concerns the public sector and the municipal utilities where the financial resources are limited and the material and technical base is outdated both morally and physically.

Implementing the energy management system involves monitoring energy consumption, developing an energy policy, planning new energy-efficient measures, calculating baseline energy consumption levels, identifying energy savings potential, and more[10]. However, an EMS is not merely a tool for reducing energy consumption; it is a strategic initiative aimed at creating a sustainable, competitive, and responsible energy system for any facility. The energy management system is a set of management

[8] Official portal of the Ministry of Energy… op. cit.

[9] KSE Institute, Report on Direct Infrastructure Damage... op. cit.

[10] State Agency on Energy Efficiency and Energy Saving of Ukraine, Energy Audit and Management. Online: https://saee.gov.ua/uk/business/energy-audit-and-management.

decisions that defines the energy policy and goals, sets the energy tasks, and ensures the achievement of these goals and tasks[11].

The energy management system can be illustrated as a series of steps forming three levels of development. Research has shown that the level of municipal energy management in cities and united territorial communities (UTC) is in the development stage (figure 3).

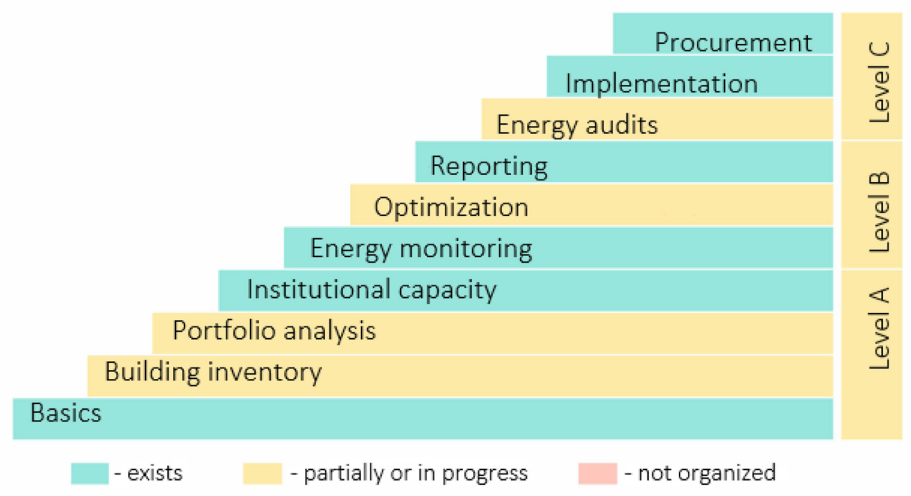


Figure 3. The level of municipal energy management in cities and united territorial communities in Ukraine

Source: according to our own research Municipal Energy Management Levels, City EM. Online: https://misto-em.org.ua/alc/lutska-otg/

Level A serves as the foundation upon which the further efficiency of the energy management system is built. This requires addressing a range of administrative and organizational tasks, primarily the appointment of a responsible person to perform the energy management tasks. One option is to assign these duties to an employee who is willing and able to take on the role of the energy manager. Another approach is to create a new position and hire a new specialist. Ideally, the candidate should have technical or construction experience, although this is not essential. The most important qualities are communication skills and motivation to work in this field. It is also necessary to develop a job description for the energy manager and allocate time resources and a budget[12].

[11] H. Zamazaieva, Energy Management: Where to Start on the Path to Energy Efficiency, „Ekonomichna Pravda". Online: https://www.epravda.com.ua/columns/2023/12/22/708004/.

[12] Municipal Energy Management in Territorial Communities, A Guide to Implementing Basic Level A, GIZ Ukraine, Kyiv 2022, p. 57.

To determine the potential for improving the energy efficiency and implementing modern technologies, a building inventory is required. The main task of the inventory is to define the scope of work for the energy manager. A tool for identifying the buildings with the greatest savings potential is the portfolio analysis. It is conducted to achieve the maximum savings and further assess modernization measures. The development of institutional capacity is a constant need for the energy manager to improve their skills and competencies in their energy management.

Level B requires thorough monitoring of the energy consumption of facilities to accurately identify and correct problems. This involves scaling data, tracking changes in consumer behavior, planning energy resource purchases, creating reports, and building a foundation for further optimization[13].

Global practice shows that improving energy efficiency is largely achieved through organizational changes in the energy management system of an enterprise or city[14]. By implementing an energy management system, significant energy savings of 3-5% can be achieved over 1-2 years without substantial financial losses[15].

Level C includes the key components that ensure a comprehensive approach to energy management. This level covers regular, comprehensive energy audits of the condition of engineering systems and building elements, in addition to the analysis of energy consumption by consumers[16].

The results of the energy audits are applied to develop the detailed energy-saving plans and to improve the infrastructure. Comprehensive programs are implemented in order to support environmental and energy standards, ensuring compliance with international energy regulations and standards. Additionally, sustainable procurement practices are introduced, which involve selecting energy-efficient equipment and technologies during tenders and purchases[17].

Energy management ensures a high degree of transparency and accountability in energy management processes, including the detailed reporting and monitoring of results.

To assess the current state of the energy management in Ukrainian urban and municipal areas, energy monitoring, data analysis, and planning are carried out on an ongoing basis. A study conducted among AEMU members and signatories of the Covenant of Mayors, through an electronic survey of officials responsible for the

---

[13] E. Inshekov, E. Nikitin, M. Tarnovsky, A. Chernyavsky, Guide to Municipal Energy Management, Poligraph Plus, Kyiv 2014, p. 238.

[14] Association Energy Efficient Cities of Ukraine, Summary of the Round Table on Implementing Energy Management and Energy Monitoring in Communities. Online: https://enefcities.org.ua/novyny/pidsumky-kruglogo-stolu-schodo-zaprovadjennya-energomenedjmentu-ta-energomonitoryngu-v-gromadah/.

[15] USAID HOVERLA Project, Action Plan for Local Government Bodies on Implementing an Energy Management System. Online: https://decentralization.ua/uploads/attachment/document/1074/.

[16] State Agency on Energy Efficiency and Energy… op. cit.

[17] Association Energy Efficient Cities of Ukraine, Review of Automated Information Systems for Energy Monitoring 2020. Online: https://enefcities.org.ua/upload/files/Publications/Analytics/Expert_review_2020.pdf.

municipal energy sector, showed that 88% of the cities surveyed assign a decisive role to the energy sector for the normal functioning of urban infrastructure and, in one form or another, set the corresponding goals and monitor their achievement[18].

68% of the surveyed cities have programs supporting energy efficiency in the residential sector, but one in five lacks the appropriate financial support. In cases where budgetary funds are allocated, the effectiveness of these programs is primarily assessed formally, based on the amount of funding and the number of beneficiaries, rather than on the actual savings achieved.

Only 50% of cities have a dedicated energy manager position or an energy management department, and in 30% of these, energy management has been added to the responsibilities of officials responsible for other matters. However, 85% of cities expressed support for the mandatory introduction of a dedicated energy manager position within local government bodies and the need for legislative regulation of this issue.

93% of the cities surveyed conduct energy monitoring, while the remaining 7% are in the process of preparing for its implementation. Monitoring mainly focuses on energy consumption based on meter readings, rather than the microclimate within buildings. Only one-third of cities have a basic set of equipment for conducting rapid building inspections. In 83% of cities, energy audits are conducted for public buildings, and 50% have initiated the energy certification of public buildings[19].

Projects and programs, while beneficial to specific communities, must also be supported by a long-term and systematic vision of the energy efficiency development on a national scale.

Energy management in the restoration and development of Ukraine's energy sector

Energy management is the first essential step towards smart energy consumption management. Government authorities, communities, and enterprises that aspire to be prepared for any energy challenges, stop wasting energy and money, and become more energy efficient and competitive should start their work with energy management[20].

In the USAID project "Improving the Efficiency and Accountability of Local Government Bodies", a systematic algorithm for implementing an energy management system is recommended (figure 4).

[18] Association Energy Efficient Cities of Ukraine, Research on the State of Energy Management in Ukrainian Cities. Online: https://enefcities.org.ua/upload/files/Publications/Analytics/Doslidzhennya.pdf.

[19] Ibidem.

[20] State Agency on Energy Efficiency and Energy… op. cit.

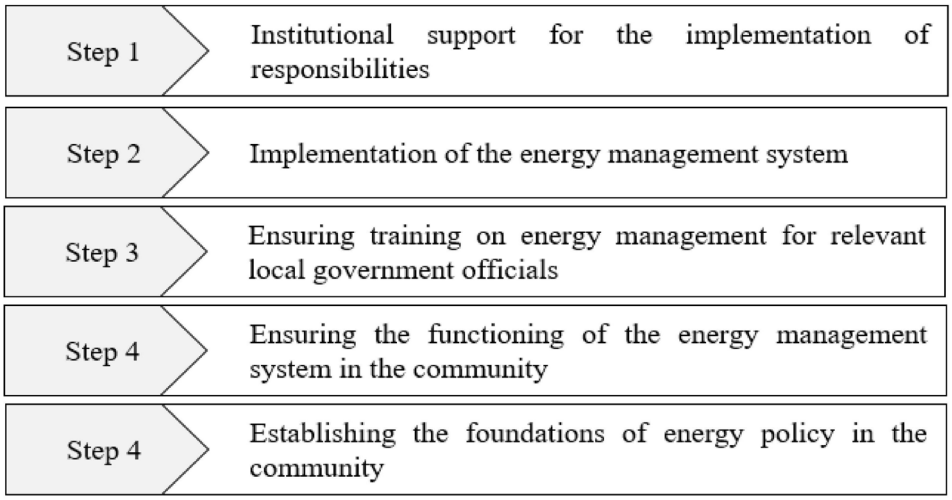


Figure 4. Algorithm for implementing an energy management system

Source: according to the USAID HOVERLA Project, Action Plan for Local Government Bodies on Implementing an Energy Management System. Online: https://decentralization.ua/uploads/attachment/document/1074/

This approach will ensure a systematic and comprehensive approach to the implementation of the energy-saving measures within the community. At each stage of implementation, a foundation is created for the effective management of the energy resources, which, in turn, will contribute to improving energy efficiency and reducing energy resource costs. Moreover, the involvement of the specialists and the training of officials will ensure the sustainable operation of the energy management system at the local level, while the formation of the community's energy policy will promote long-term energy stability and sustainable development.

Energy management allows for the consideration of various energy efficiency measures and the selection of those that will be most appropriate and bring the greatest effect. These measures do not necessarily have to be expensive. Even without significant financial investments, simply by setting up an energy management system, energy consumption can be reduced by 5-15%[21].

As of today, several important steps have been taken in Ukraine to implement energy management systems, particularly in the context of enhancing energy efficiency and energy independence:

1. Legislative foundation established – a number of laws have been adopted, including the Law of Ukraine "On Energy Efficiency"[22] and the CMU Resolution "On

[21] State Agency on Energy Efficiency and Energy… op. cit.

[22] Law of Ukraine of October 21, 2021. No. 1818-IX On Energy Efficiency, „Bulletin of the Verkhovna Rada of Ukraine" 2022; 2(article 8).

the Implementation of Energy Management Systems"[23]. They provide the legal basis for energy-saving measures at the local and national levels.

2. State programs – the programs supporting energy conservation have been introduced, such as the Government's "Warm Loans" program for homeowner associations, private households, and businesses. Additionally, EU and USAID programs aimed at improving energy efficiency are actively operating. In line with the EU Directive on Energy Efficiency of Buildings, long-term plans are being developed to promote the concept of zero-emission buildings. These buildings will require minimal energy, and all of it will be produced from renewable energy sources. While this involves a significant investment, it is expected to save about 50% of energy costs in the long term[24].

According to the Law of Ukraine "On Energy Efficiency"[25], the Ministry of Regional Development has developed the Building Thermal Modernization Strategy through 2050[26]. It outlines the country's goals for building modernization and how that can be achieved. In the coming years, an action plan will also be developed as a part of this strategy.

To enhance energy efficiency, Ukraine plans to implement the construction of nearly zero-energy buildings[27]. Additionally, most of this energy should come from renewable sources, ideally generated directly on or near the buildings.

The National Recovery Plan of Ukraine, developed by the Ukrainian government in collaboration with hundreds of experts, already includes housing modernization projects. These projects cover energy efficient reconstruction of housing, the introduction of heat pumps, and even pilot construction of nearly zero-energy buildings[28]:

3. Energy management system established. To ensure compliance with item 5 of the Resolution, the State Energy Efficiency Agency has mandated that government authorities and local self-governance bodies provide information on the status and results of their energy management systems to the agency. Many communities are already implementing the energy management systems. Local

[23] Resolution of the Cabinet of Ministers of Ukraine of May 10, 2024. No. 540 On Amending the Resolution of the Cabinet of Ministers of Ukraine of December 23, 2021, No. 1460. Online: https://zakon.rada.gov.ua/laws/show/540-2024-%D0%BF#Text.

[24] EcoAction, What is energy efficiency and how to implement it? Online: https://ecoaction.org.ua/.

[25] Law of Ukraine of October 21, 2021. No. 1818-IX On Energy Efficiency… op. cit.

[26] Operational Plan for Implementing the Long-Term Strategy for Building Thermo-Modernization for the Period 2024-2026, up to 2050. Online: https://zakon.rada.gov.ua/laws/show/1228-2023-%D1%80#n16.

[27] Association Energy Efficient Cities of Ukraine, Green Book on Energy Efficiency at the Municipal Level. Online: https://cdn.regulation.gov.ua/3b/d3/cb/a5/regulation.gov.ua_File_185.pdf.

[28] Resolution of the Cabinet of Ministers of Ukraine of October 17, 2011. No. 1056 Certain Issues of Fund Utilization in the Field of Energy Efficiency and Energy Conservation. Online: https://zakon.rada.gov.ua/laws/show/1056-2011-%D0%BF/paran17#n17.

governments, with the support of international programs, are learning to implement tools for monitoring and managing energy consumption[29],[30].

4. Partnership with international organizations. With the involvement of organizations such as GIZ, USAID, and the European Bank for Reconstruction and Development (EBRD), projects are being implemented to modernize the infrastructure and train the specialists in energy efficiency.

As a potential EU member, Ukraine aligns its goals with the European standards. Within the framework of the European Green Deal, the EU aims to achieve full decarbonization (i.e. reducing greenhouse gas emissions to levels that can be fully absorbed by the ecosystems or other methods) of the building sector by 2050[31].

5. Information and awareness-raising activities. Training sessions, seminars, and consultations are conducted for local government and business representatives on energy management and efficiency[32].
6. Energy efficiency in the public sector. Projects are being implemented to modernize public facilities, such as schools, hospitals, and kindergartens. Local governments are increasingly introducing systems for accounting and optimizing energy consumption.

Energy management plays a critically important role in the recovery and development of Ukraine's energy sector, ensuring efficiency, sustainability, and the optimal use of energy resources.

Conclusions

Overall, Ukraine is gradually moving towards increased energy efficiency, but full implementation of the energy management systems still requires more active support at all levels, as well as additional investments and technical resources.

In wartime conditions, the energy management in Ukraine becomes critically important, as the country faces infrastructure destruction, disruptions in energy resource supply, and a growing threat of an energy crisis. Military actions significantly complicate the effective management of energy systems while increasing dependence on external energy sources. This presents Ukraine with the challenge not only of maintaining the operation of the energy sector under emergency conditions but also of finding ways to optimize and develop it.

---

[29] Resolution of the Cabinet of Ministers of Ukraine of July 14, 2023. No. 720 On Establishing the Fee for Independent Verification of the Energy Audit Report at the Request of the Energy Audit Customer. Online: https://zakon.rada.gov.ua/laws/show/720-2023-%D0%BF#Text.

[30] Resolution of the Cabinet of Ministers of Ukraine of May 10, 2024… op. cit.

[31] Communication from the European Commission, The European Green Deal. Brussels. December 11, 2019. Online: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52019DC0640.

[32] Association Energy Efficient Cities of Ukraine, Summary of the Round... op. cit.

We believe that the primary tasks of the energy management in wartime should be:
- increasing security measures for energy infrastructure objects;
- transitioning to more resilient and renewable energy sources, which will reduce the country's vulnerability to external threats and ensure energy independence;
- reducing energy costs and ensuring the uninterrupted operation of energy infrastructure in crisis situations, maximizing efficient and rational energy consumption is an additional weapon in countering the energy terror perpetrated by Russia;
- meeting the energy needs of the civilian population during the armed conflict;
- collaborating with international partners to secure support and assistance in the energy sector.

Future reconstruction of Ukraine must be based on energy management, as the sustainable development of the country after the war requires the effective use of energy resources and a shift to more ecological and modern technologies. Implementing energy management will allow for optimized energy consumption, reduced dependence on fossil fuels, and enhanced energy independence.

Specifically, focusing on the renewable energy sources such as solar, wind, and bioenergy will help reduce the carbon emissions, which are a key factor in combating climate change. Energy efficiency across all sectors, from construction and infrastructure to industry, will result in cost reductions and increased competitiveness on the international market.

Investments in modernizing the country's energy system will not only drive the economic growth but they will also improve the quality of life for its population. Utilizing modern monitoring and energy management technologies will ensure stability and security of the energy system amid a volatile global economy and potential new challenges.

Bibliography

Association Energy Efficient Cities of Ukraine, Green Book on Energy Efficiency at the Municipal Level. Online: https://cdn.regulation.gov.ua/3b/d3/cb/a5/regulation.gov.ua_File_185.pdf.

Association Energy Efficient Cities of Ukraine, Research on the State of Energy Management in Ukrainian Cities. Online: https://enefcities.org.ua/upload/files/Publications/Analytics/Doslidzhennya.pdf.

Association Energy Efficient Cities of Ukraine, Review of Automated Information Systems for Energy Monitoring 2020. Online: https://enefcities.org.ua/upload/files/Publications/Analytics/Expert_review_2020.pdf.

Association Energy Efficient Cities of Ukraine, Summary of the Round Table on Implementing Energy Management and Energy Monitoring in Communities. Online: https://enefcities.org.ua/novyny/pidsumky-kruglogo-stolu-schodo-zaprovadjennya--energomenedjmentu-ta-energomonitoryngu-v-gromadah/.

Communication from the European Commission, The European Green Deal. Brussels. December 11, 2019. Online: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52019DC0640.

EcoAction, What is energy efficiency and how to implement it? Online: https://eco-action.org.ua/.

Inshekov E., Nikitin E., Tarnovsky M., Chernyavsky A., Guide to Municipal Energy Management, Poligraph Plus, Kyiv 2014, p. 238.

KSE Institute, Report on Direct Infrastructure Damage Due to the Russian Military Aggression Against Ukraine as of Early 2024. Online: https://kse.ua/wp-content/uploads/2024/04/01.01.24_Damages_Report.pdf.

Law of Ukraine of October 21, 2021. No. 1818-IX On Energy Efficiency, „Bulletin of the Verkhovna Rada of Ukraine" 2022; 2(article 8).

Municipal Energy Management in Territorial Communities, A Guide to Implementing Basic Level A, GIZ Ukraine, Kyiv 2022.

Official portal of the Ministry of Energy of Ukraine. Online: https://mev.gov.ua/.

Operational Plan for Implementing the Long-Term Strategy for Building Thermo--Modernization for the Period 2024-2026, up to 2050. Online: https://zakon.rada.gov.ua/laws/show/1228-2023-%D1%80#n16.

Resolution of the Cabinet of Ministers of Ukraine of July 14, 2023. No. 720 On Establishing the Fee for Independent Verification of the Energy Audit Report at the Request of the Energy Audit Customer. Online: https://zakon.rada.gov.ua/laws/show/720-2023-%D0%BF#Text.

Resolution of the Cabinet of Ministers of Ukraine of May 10, 2024. No. 540 On Amending the Resolution of the Cabinet of Ministers of Ukraine of December 23, 2021, No. 1460. Online: https://zakon.rada.gov.ua/laws/show/540-2024-%D0%BF#Text.

Resolution of the Cabinet of Ministers of Ukraine of October 17, 2011. No. 1056 Certain Issues of Fund Utilization in the Field of Energy Efficiency and Energy Conservation. Online: https://zakon.rada.gov.ua/laws/show/1056-2011-%D0%BF/paran17#n17.

Russian Attacks Destroyed 80% of Thermal Generation in Ukraine, Radio Svoboda, April 5, 2024. Online: https://www.radiosvoboda.org/a/news-enerhetyka-shmyhal--udary-rosiyi/32892560.html.

State Agency on Energy Efficiency and Energy Saving of Ukraine, Energy Audit and Management. Online: https://saee.gov.ua/uk/business/energy-audit-and-management.

USAID HOVERLA Project, Action Plan for Local Government Bodies on Implementing an Energy Management System. Online: https://decentralization.ua/uploads/attachment/document/1074/.

Zamazaieva H., Energy Management: Where to Start on the Path to Energy Efficiency, „Ekonomichna Pravda". Online: https://www.epravda.com.ua/columns/2023/12/22/708004/.

*Sylwia Skrzypek-Ahmed**
*Andrew E. Zamani***
*Krzysztof Dyrek****
*Iloh John Paul Izuchukwu & Nwammuo Collins*****

INTERNATIONALISATION AND GLOBALISATION OF BUSINESS AND THE INTERNATIONAL ENVIRONMENT OF THE COMPANY IN THE CONTEXT OF GLOBAL MARKETING

Internacjonalizacja i globalizacja biznesu a otoczenie międzynarodowe przedsiębiorstwa w kontekście marketingu globalnego

*PhD., Assoc. Prof., WSEI University in Lublin, ORCID: 0000-0002-1211-0683
**PhD., Assoc. Prof., Nasarawa State University in Keffi, ORCID: 0000-0002-1526-6931
***MA, School of Business – National-Louis University in Nowy Sącz (WSB-NLU), ORCID: 0009-0002-3108-4369
****PhD., Assoc. Prof., Chukwuemeka Odumegwu Ojukwu University, ORCID: 0009-0008-3513-4099

Streszczenie

Cele strategiczne operacji marketingowych na rynku zewnętrznym, forma umiędzynarodowienia marketingu czy alokacja środków firmy uwarunkowane są w dużej mierze orientacją międzynarodową zarządu (znaną też jako predyspozycje strategiczne), oznaczającą stanowisko kierownictwa co do prowadzenia działań na rynkach zewnętrznych i jego skłonność do podejmowania ryzyka wiążącego się z internacjonalizacją. Nadto z dużą dozą prawdopodobieństwa stwierdzić można, iż w najbliższych latach coraz bardziej uzasadnione będzie regiocentryczne podejście do klientów. Owszem, z powodzeniem działają na światowym rynku korporacje transnarodowe o ugruntowanej od lat pozycji i wizerunku, a także licznie pojawiają się w ostatnich latach firmy zwane „born globals", których rozwój nie przebiega wedle typowej drogi internacjonalizacji. Mowa tu głównie o podmiotach z branży nowoczesnych technologii, oferujących wyspecjalizowane, unikatowe usługi i produkty – mimo iż są to firmy niewielkie, to jednak wysoce konkurencyjne w skali międzynarodowej ze względu na innowacyjność asortymentu. Jednak wszystko wskazuje na to, że gigantyczne korporacje, standaryzujące swe marki i produkty dla wszystkich rynków docelowych, mają już swój złoty wiek za sobą. W dzisiejszych czasach konsument pragnie w coraz większym stopniu być nie tylko biernym odbiorcą oferty, lecz również aktywnie ją kształtować, a więc staje się prosumentem, tym samym komplikując producentom możliwości standaryzacji w marketingu.

Słowa kluczowe: *internacjonalizacja, globalizacja, marketing międzynarodowy, korporacje transnarodowe, born global*

Summary

The strategic aims of marketing operations on the external market, the form of internationalisation of marketing or the allocation of the company's resources are largely determined by the international orientation of the management (also known as strategic predisposition), denoting the management's stance on the conduct of activities on external markets and its willingness to take the risks associated with internationalisation. In addition, it is very likely that a region-centric approach to customers will become more and more justified in the coming years. It is true that transnational corporations with a long-established position and image have been successfully operating on the global market, and there have also been a number of so-called "born globals", which have not developed along the typical path of internationalisation in recent years. These are mainly high-tech companies with specialised, unique services and products – although small in size, they are highly competitive internationally due to their innovative product ranges. However, all indications are that the giant corporations, standardising their brands and products for all target markets, are past their golden age. Nowadays, the consumer increasingly wants not only to be a passive recipient of an offer, but also to actively shape it, and so is becoming a prosumer, thus complicating the opportunities for manufacturers to standardise in marketing.

Key words: internationalisation, globalisation, international marketing, transnational corporations, born global

Introduction

International marketing refers to all the marketing operations of a company in the context of its economic activities carried out outside its own country. Therefore, it does not refer exclusively to exports, but also to other forms of internationalisation (establishment of foreign branches, conclusion of commercial contracts with contractors outside the country in the form of joint-ventures, franchising, etc.). The term 'international marketing' coincides with the term 'marketing in foreign markets' and they are used interchangeably. At the same time, it represents the opposite concept to marketing in the local market. The term 'foreign marketing' is also used to cover all marketing operations carried out in a given external market by a company's subsidiaries. A similar term is multinational marketing, which exposes the characteristics of individual foreign markets, which is of key importance for a company with a polycentric orientation. The term 'export marketing', on the other hand, has a much narrower meaning, as it refers to marketing undertakings related to export, i.e. the sale of goods or services in markets other than the domestic one; also when the company selects a foreign sales market on its own and modifies the strategy with respect to its

specificity. Meanwhile, the last term – global marketing – refers to enterprises that operate in a global (world) market environment, although not always standardising all activities. This term is used primarily in relation to transnational corporations.

The strategic aims of marketing operations on the external market, the form of internationalisation of marketing or the allocation of the company's resources are largely determined by the international orientation of the management (also known as strategic predisposition), denoting the management's stance on the conduct of activities on external markets and its willingness to take the risks associated with internationalisation. In addition, it is very likely that a region-centric approach to customers will become more and more justified in the coming years. It is true that transnational corporations with a long-established position and image have been successfully operating on the global market, and there have also been a number of so-called 'born globals', which have not developed along the typical path of internationalisation in recent years. These are mainly high-tech companies with specialised, unique services and products – although small in size, they are highly competitive internationally due to their innovative product ranges. However, all indications are that the giant corporations, standardising their brands and products for all target markets, are past their golden age. Nowadays, the consumer increasingly wants not only to be a passive recipient of an offer, but also to actively shape it, and so is becoming a prosumer, thus complicating the opportunities for manufacturers to standardise in marketing.

International business

Currently, activity on international markets is no longer the domain of large corporations. For years, smaller companies have focused their activities on local markets, and if they have entered foreign markets, they have done so very cautiously, mainly as subcontractors or in cooperation with large corporations. Meanwhile, the changes that occurred at the turn of the 20th and 21st centuries as a result of the development of information and communication technologies have proven to be very friendly to start-up small companies, also in the sphere of international operations. A new phenomenon is undoubtedly the emergence of a group of young, dynamic companies that are actively entering international markets, practically from the moment they start their operations (born global). Therefore, we currently have a large group of enterprising early exporters on the market, who sell goods and services abroad irregularly and on a small scale. This segment can be described as an export small business[1]. A dynamically developing segment, especially in the era of technological change and strong emphasis on process and project management in building and maintaining business relationships.

The development of companies and their expansion will be based to a large extent on knowledge, skills and digital competences, including modern marketing tools. Online tools are increasingly used in running and developing businesses – it also indicates the

[1] J. Cieślik, Entrepreneurship, politics, development, Academic Publishing House SEDNO, Warsaw 2014.

still untapped potential of Polish entrepreneurs, especially in the case of SMEs. The presence of a company's online business can no longer be limited to having a website, e-mail box or a profile on a social networking site. In the face of advancing digitization and on the threshold of the so-called „Internet of all things", digital marketing education of companies is therefore becoming a key and most important need, correlated with modern process and project management, based on sophisticated IT tools.

A new trend in business development and its competitiveness is mmarketing automation to segment of IT systems for marketing and sales management. This system streamlines, automates and measures all marketing and sales activities, while simultaneously connecting them with the individual recipient and their effect. The digital revolution will significantly shape modern business, its models and the way a company is managed.

International business is characterized by a multi-level approach to empirical phenomena. The basic levels of analysis here are: the activities of individual managers, enterprises, the sector and the entire environment. Each of them is characterized by great diversity Nowakowski defines that international business includes transactions that are designed and carried out across national and cultural boundaries in order to meet the needs of individual buyers, enterprises and organizations[2]. It can be presented as a field in which several disciplines are outlined, partly overlapping and partly complementary. These are: international management, international marketing, global marketing (as a subsystem of international marketing) and international finance.

Shenkar defines international business as an area where general knowledge about how to do business in the international market is combined with regional know-how. Both components create a kind of „knowledge platform" based on theoretical foundations and difficult to imitate. General knowledge refers to such fundamental issues as international institutions, trade agreements, regional organizations, etc. As for regional know-how, it refers to the cultural, religious, political and economic conditions of individual countries and regions. International business explains the behavior of companies in local markets, taking into account the aforementioned conditions - which is an extremely important ability.

Griffin and Pustay point out that international business includes economic transactions between entities from more than one country[3]. Examples include purchasing materials and delivering them to a foreign recipient for use in production processes, shipping finished products from one country to another for wholesale, launching a business abroad due to lower labor costs, etc. The entities involved in such transactions may be individuals, private companies, groups of companies, or government agencies.

Ball and McCulloch draw attention to an important circumstance accompanying international business[4]. Namely, they emphasize that a company operating across

[2] M. Nowakowski, International business. From internationalization to globalization, SGH, Warsaw 2015, p. 19.

[3] R. W. Griffin, M. W. Pustay, International Business. A Managerial Perspective, Pearson Prentice Hall, New Jersey 2007, p. 5.

[4] D. Ball, W. H. McCulloch, International Business – Introduction and Essentials, Addison-Wesley Publishing Company, New York 1991, p. 13-14.

borders must cope and be able to move in three environments - in the domestic environment of the country of origin, in the foreign environment of the country of expansion and in the international environment. Gorynia proposes that the concept of international business in the broad sense of the word should be defined as all types of economic activity, provided that they take place between countries, regardless of whether the relations concern countries as a whole, industries, sectors, regions, consumers, entrepreneurs and regardless of whether these are real or regulatory relations.[5]. Based on the cited definition, he states that the distinguishing feature of international business in the context of all economic activity is the presence of an „international element". The definition proposed by Gorynia seems to be the broadest of those cited above. Its advantage is that it draws attention to both the real and regulatory aspects of the activity that creates international business.

It is important to remember the scale and course of globalization processes and the planes on which these processes take place. The first plane is globalization, and the second is the strong, tense and diverse development of regional integration processes. The processes mentioned above also constitute fundamental challenges for international business, because entities operating in its environment must cope with phenomena such as continuous technical and technological progress, shortening of the product life cycle, the growing importance of the scale of production and sales, the intensification and emergence of new forms of competition, the huge increase in the importance of research and development and innovation, the virtualization of many areas of business activity and business communication[6].

Globalization of the enterprise

Globalization of the enterprise is a multi-threaded and complex phenomenon, which is why there are many definitions of this concept. Most authors use it in relation to three elements, such as: – worldwide scope – geographical meaning, means an enterprise covering the entire world with its operations, as opposed to enterprises with a local (national) or regional (several countries) scope; – worldwide homogeneity – disappearance of international diversity, means an enterprise selling the same product in all geographical markets it serves, as opposed to a product tailored to local specifics; – worldwide integration – category of dependence and tightening of international links, means an enterprise that clearly feels the effects of events taking place in other countries, as opposed to the local market, where the foreign situation has a negligible impact on the level of prices, dynamics of competition, demand and prevailing fashions[7]. Internationalization and globalization require companies

[5] M. Gorynia, On the classification of sciences dealing with international economic activity, [in:] Globalization and regionalization in the world economy. Jubilee book of Professor Jan Rymarczyk, B. Skulska, M. Domiter, Warsaw 2012, p. 45.

[6] J. Rymarczyk, International Business, Polish Economic Publishing House, Warsaw 2012, p. 25.

[7] B. De Wit, R. Meyer, Strategy Synthesis, PWE, Warsaw 2007, p. 311.

to apply different strategies, which depend on the company's structure, the form of business, and the geographical structure. However, it seems that these processes encourage companies to choose a strategy based more often on mergers, acquisitions, and building strategic alliances with competitors, i.e. choosing an external path of growth and development. Different approaches to strategy most often used by international and global companies are presented in table 1[8].

Table 1. Specification of selected strategic orientations of international enterprises

Strategy Name	Characteristic
Strategic orientation – strategies for operating on international markets	
international	It involves using a competitive advantage gained on the domestic market abroad. It is characterized by a limited share in the world market, a limited geographical scope of operations and a high degree of centralization of operational and strategic decisions. It is used by companies with a low degree of internationalization of their operations.
multinational	It consists in adapting its products to the diverse requirements of foreign markets. The activities of the company's foreign branches are based on their independent use of key competences, capabilities and resources transferred from the parent company. It provides a competitive advantage in such factors as: local adaptation to the tastes and desires of customers, sales and distribution methods, loyalty to the company's country of origin and the time of response to changes in demand.
global	It consists of delivering the same product to all markets, treated as one identical market. It is based on the pursuit of minimizing production costs by achieving scale effects. It provides a competitive advantage in such factors as: price, modernity and quality of the product, intensity and quality of promotion, scale of presence on the market, product brand and company reputation.
transnational	It consists of an attempt to simultaneously achieve benefits from the globalization of operations and adapt to local conditions. The company delocalizes a large part of decisions and activities to individual markets, but some activities remain centralized. The market share is global, and the distribution of shares in the markets of individual countries is relatively even.
Enterprise internationalization strategies	
market	It involves achieving economies of scale by conquering new foreign markets.
financial	It involves obtaining finance for the company's operations through foreign capital markets by issuing bonds on foreign financial markets and by taking out loans from foreign banks.

[8] A. Zakrzewska-Bielawska, Internationalization and globalization and enterprise development strategies, [in:] Instruments and areas of organizational transformations and changes in the conditions of globalization, A. Potocki (ed.), Difin, Warsaw 2009, p. 339-348.

coalition	It involves continuous cooperation with a foreign partner, coordination of activities and implementation of common goals. It can take various forms, e.g. joint marketing and sales of joint products, joint research and development, etc.
proprietary	It can have a variety of nature depending on the purpose of the company. For example, large state-owned companies look for foreign investors for restructuring and modernization; foreign corporations look for companies that have well-known brands on the local market and have high future profitability, but are unable to make investments that would allow them to achieve international competitiveness; companies look for foreign investors to improve and recapitalize their operations; companies also often invest abroad in search of access to attractive markets, natural resources, cheap labor, qualified staff and modern technologies.
Strategies for developing the company's international position	
growth and expansion	It aims to achieve market leadership, applied to products and markets of countries with predicted high and medium market attractiveness.
consolidation and securing positions	Its aim is to generate a surplus of funds to finance growth strategies and create a market position, which is beneficial for companies with a market leadership position.
creating a market position	It aims to improve the position and increase the market share, used by companies new to a given market or introducing a new product.
withdrawal and reduction of investment processes	Means withdrawal from the market or withdrawal of a product, applies to products or markets of countries generating permanent or periodic losses and negative cash flow.
Global strategies	
global cost leadership	It is based on differences in expenditure in individual countries and economies of scale.
concentration on a global scale	It is based on the markets of selected countries, segments, and market niches.
global diversification	It is a combination of geographical and production diversification.

Source: own study based on: A. Zakrzewska-Bielawska, Internationalization and Globalization and Enterprise Development Strategies, [in:] Instruments and Areas of Organizational Transformations and Changes in the Conditions of Globalization, A. Potocki (ed.), Difin, Warsaw 2009; J. Rymarczyk, Internationalization and Globalization of an Enterprise, PWE, Warsaw 2004; A. K. Koźmiński, International Management, PWE, Warsaw 1999; B. Liberska, Globalization. Mechanisms and Challenges, PWE, Warsaw 2002; M. Moszkowicz, Strategic Management. Systemic Concept of Business, PWE, Warsaw 2005; Z. Pierścionek, Competition and Enterprise Development Strategies, PWN Scientific Publishing House, Warsaw 2003

Globalizationis a feature of the contemporary stage of development of the world economy, which is less and less reminiscent of the traditional economy, based on the sum of national economies. It is a completely new quality. The globalization of the world economy means not only a complex and multidimensional process, but also a very complex and variable structure, as a result of which a "uniform" – in the spatial and economic dimension – world market is created, integrating many, if not all countries and regions. Globalization is a sequential process with various forms that can be considered at specific scales, depending primarily on the territorial scope. On a macro scale – it expresses a global perspective and dimension, but also refers to continents, countries and regions, on a meso scale – it concerns economic branches and industries, while on a micro scale – enterprises[9]. The process of globalization in almost all areas of life – in economics, law, education, science, politics, culture, tourism or consumption patterns – has made national economies more interdependent than before. It leads to qualitatively new economic links between individual continents, countries and their regional groupings, as well as markets and enterprises. Globalization is one of the most significant phenomena and processes of our times, creating new opportunities, but also threats. This results from its very wide scope and the multithreading, multidimensionality and complexity of economic, technical, social, cultural and political phenomena covered by this term[10].

The term globalization also encompasses a new process of strategic thinking and management in line with the characteristics and nature of the information society as well as entrepreneurial and innovative cross-border business. The process in question is based on a global perspective focusing on:

- development of an intelligent knowledge economy focused on the full fulfilment of the needs and requirements (satisfaction) of both global and local customers,
- shaping research, development and transfer of knowledge and technologies, especially advanced ones and at a growing level of education,
- information civilization based on knowledge and its diffusion,
- shaping the global economic order and the activities of transnational corporations,
- standardization of resource- and labor-saving products and services,
- the internationalization of enterprises and the links between them and the growth of international trade, including the improvement of global logistics processes,
- globalization and liberalization of financial markets and flows and their instability (reduced risk sensitivity),
- a free global market with a high level of competitive forces and increasingly fierce rivalry,
- internal integration of the world economy, alliances of organizational networks, interdependence of the needs of cooperation and coordination,

[9] J. Rymarczyk, Internationalization and Globalization of Enterprises, PWE, Warsaw 2004, p. 6-7.

[10] J. Walas-Trębacz, Globalization - premises and challenges for enterprises operating on international markets [in:] Management of an international enterprise.Integration of Diversity, J. W. Wiktor (ed.), CH Beck Publishing House, Warsaw 2017, p. 11.

- localization of foreign investments and striving to maximize added value and minimize costs,
- the growing importance of the requirements of sustainable development of the world, including environmental protection problems (saving resources, energy, preventing pollution, recycling resources, etc.)[11,12].

Global businessmeans the scope of all activities and their ability to participate in the global market. It includes all commercial, borderless activities of enterprises, including the flow of resources (raw materials, capital, people, technology), goods (semi-finished and finished products), services (financial, commercial, communication, information and education) and skills (managerial and technical). Global business operates with almost complete freedom of movement of goods, services and capital, with full openness to external competition, which is growing not only in scope but also in quality. It contributes to a fundamental raising of the bar of competition in the global market. In the conditions of globalization, the nature and quality of all competitive forces are also changing. The position of domestic recipients and suppliers is decreasing, because in the conditions of market liberalization and internationalization, a domestic recipient can be replaced by a foreign (external) recipient, and a domestic supplier by a foreign (external) supplier. The number of substitutes for goods and services is also growing, and consequently the power of the global customer[13,14].

A feature of contemporary business conditionsin the global conditions and functioning of transnational enterprises is the constant geographical, economic and social expansion of their activities. This is an inspiration for creating new strategic forms of enterprise activity in the global environment and building new models of business organizations that facilitate rapid cooperation, coordination and establishing relationships across organizational boundaries. These processes are expressed by the emergence of various networks of organizations with high interdependence and internal solid but at the same time open and flexible connections. This is about creating the potential to maximize value for the buyer by building a network of abilities, skills and resources. The functioning of such networks allows for connecting within the framework of joint initiatives and innovative activity, using various unique skills and creating specialist configurations and competences distributed in many network organizations. The network creates more potential opportunities for the development of innovative activities and innovative activity linking the economic sphere with the logistics sphere[15].

---

[11] C. L. Pearce, J. A. Maciariello, H. Yamawaki, Drucker's Legacy, Wolters Kluwer, Warsaw 2013.

[12] G. Stonehouse, J. Hamill, D. Campbell, T. Purdie, Globalization. Strategy and Management, Felberg SJA, Warsaw 2001.

[13] W. Szymański, Globalization, challenges and threats, Diffin, Warsaw 2001.

[14] A. Tubielewicz, The concept of creating a network organization [in:] Innovations in production management and engineering, R. Knosali (ed.), Publishing House of the Polish Society for Production Management, Opole 2013.

[15] A. Tubielewicz, The concept of creating a network organization [in:] Innovations in production management and engineering, R. Knosali(ed.), Publishing House of the Polish Society for Production Management, Opole 2013.

Networked international, inter-organizational and inter-functional global dimensionchanges management concepts, marketing concepts, and techniques and methods used to manage research and development, operations, production, logistics, and distribution and customer services. Vertical and horizontal integration, configuration, cooperation, and coordination of transnational network enterprises require the introduction of interfunctional management on a global scale, which consists in coordinating and coordinating resources and activities located in different countries to perform the functions of research and development, product manufacturing, marketing, and logistics. At the same time, it requires cross-cultural management focusing on organizational behavior in international settings and on the interactions of people from more than one culture[16].

Globalization of the economy and marketing operations and internationalization of marketing

Among factors, influencing the internationalization of enterprises, it should be pointed out that their increasingfocus on marketing activities, which are addressed to consumers around the world.Marketing operations conducted on foreign markets create a system of mutually dependent, differentiated and transformable elements, constituting the so-called marketing mix, which refers to determining specific product properties, price, promotion and distribution. From the company's perspective, these components are controlled variables, conditioned by, among other things, the funds at its disposal, the implemented marketing strategy or the company's management methods.

The starting point for marketing activities organization (which are part of its market strategy) is the strategy of entering the foreign market, determined by the management assumptions and the appropriate allocation of resources. The strategies for expansion into international markets are diversified in terms of: the location of production facilities, the scope of supervision over marketing operations, the scale of resource involvement and their individual types, as well as the degree of risk taken, flexibility (including the possibility of withdrawal from the market) and the time horizon considered by the company.

The overall strategy of a business entity and its marketing strategy share a number of common aspects, such as the concentration of both the mission, goals, and marketing operations on the requirements of target customers and the possibilities of meeting them. Most of the issues related to the preparation of a strategic plan concern marketing variables, so separating marketing planning from strategic planning may pose some difficulties. The role of marketing in creating a strategy is to provide a guiding philosophy, according to which the functioning of the company should be based on meeting consumer needs, providing input data that allows for

[16] A. K. Koźmiński, International Management, Polish Economic Publishing House, Warsaw 1999.

the recognition of market opportunities and indicating the possibilities of their use, and developing methods for implementing the tasks set for individual departments or branches.

The search for sales opportunities among foreign buyers by companies is usually associated with the simultaneous internationalization of marketing. Globalization of activities does not always mean increasing the scale of export of one's own production, because it often means undertaking international marketing activities, which involve the company's resources to a greater extent than is the case with a simple export strategy (indirect or even direct). These activities include, among others: increased supervision over foreign marketing ventures, a longer planning perspective, intensification of the company's international operations in the context of its development strategy. When considering the issue of internationalization, it is worth considering elements of internationalization, based on the company's activities in the field of import of raw materials or technology, as well as other types of meeting production and trade needs on external markets and international cooperation in the field of production or marketing.

The gradual development of a company towards its internationalization begins when the management becomes aware of the prospects that open up for companies operating on the global market. The next step towards internationalization is the analysis of the management's ability to use these prospects, and in the next phase, the assessment of the possibilities of competing in the international environment, related to the assortment or production potential of the company, as well as in the scope of marketing activities. It is also necessary to consider whether the company has sufficient resources of financial, human and knowledge capital to be able to effectively compete with foreign competitors. This process ultimately leads to the decision to start internationalization.

Internationalization marketing and the internationalization of the entire business activity are the result of the influence of various factors related to the benefits planned or obtained as a result of this process. These benefits, resulting from the presence on external markets and connected with the profits resulting from conducting marketing operations on these markets, are defined by two groups of reasons. The first one includes market motives, i.e. existing and forecasted differences in the conditions of the company's operation in the country and abroad – when the aforementioned differences indicate greater profitability of conducting business on the foreign market. The second type of determinants are cost motives, meaning, among other things, the possibility of obtaining economies of scale when the company is present on the domestic and foreign markets at the same time. The benefits may refer to issues related to production, marketing or supply and should cover additional costs incurred due to customs, transport, insurance, etc., and related to expanding the business outside the domestic market. In addition, the so-called experience curve effect is observed. The components of the above-mentioned categories of motives are also present in another group of internationalization factors, called import (supply). The driving force of the company's internationalization process may also be the economic policy

tools of the home country's government, e.g. export-stimulating measures: trade contracts concluded at the intergovernmental level, tax relief for companies producing for export (not constituting export subsidies in the light of European Union regulations), export credit guarantees, promoting the country's image abroad or disseminating the results of market analyses. In addition, the reasons for internationalization may lie in the instruments of the economic policy of foreign countries and be related to increasing the attractiveness of their markets for foreign investors. The presented tools, related to the actions of the authorities of individual countries, are referred to as political motives.

Among the reasons that guide companies in engaging in international activities, market factors seem to have the strongest influence. Companies often begin exploring external markets when the local market is saturated or stagnating, while the international environment is experiencing an increase in demand for a given product or service. A change in the market realities in a given country implies the need to redefine the company's marketing strategy used there, or the need to seek alternative solutions in terms of new sales opportunities.

Another division of the determinants of internationalization of enterprises consists in distinguishing them as proactive and reactive, also defined as push and pull factors. This classification is based on the relationship between the internal and external conditions of the company. Proactive factors of internationalization are motives based on: knowledge of the management, its inventiveness and understanding of the market environment and its dynamics, and therefore knowledge of the external market or characteristics of target customers, conviction about the uniqueness of one's offer, orientation on the profits resulting from participation in the international market, scale and tax advantages, having technological advantages. The expectation of the management is usually to obtain higher income from foreign sales than from domestic sales. Reactive factors of internationalization, on the other hand, have their source in the conditions and modifications of the local and foreign environment of the company, and at the same time concern the actions of the management in response to external stimuli. This group of causes includes: production surpluses, reaching a saturation point on the domestic market, competition activities (e.g. its internationalization), close proximity to external markets, a significant decline in sales results on the domestic market and the internationalization of local partners.

Marketing research allow us to state that companies that conduct the internationalization process based on proactive reasons gain greater benefits than those guided by reactive factors, because they are more clearly focused on meeting the needs of external buyers and develop long-term marketing strategies on foreign markets. On the other hand, companies whose operations are keyly influenced by reactive factors are more strongly involved in current operational activities and ad hoc projects, while being less oriented towards creating long-term plans.

Internationalization of marketing is associated with risks and threats, which are much greater and more diverse than in the case of functioning in the home market. Intensification of the involvement of the company's resources abroad is usually

associated with an increase in the resulting degree of uncertainty, but the scale of the risk is largely dependent on the specifics of the target market. Diversification of this risk becomes a complementary factor of internationalization for companies, because it contributes to initiating activity in new markets, thus constituting a motive for moving to the next stage of internationalization.

The process of business internationalization

The decision to start operations on foreign markets means moving to competing in completely new conditions. An appropriate analysis of the environment in which the company will have to compete is a necessary condition for making decisions about internalizing operations. The company's environment consists of those that are not part of the company, but are directly or indirectly related to it:

- phenomena,
- processes,
- entities.

When entering a new market, especially a foreign market, a company must deal with a number of barriers, any of which can lead to the failure of the entire venture[17].

Particular attention should be paid to:

- the need to obtain access to distribution channels – when entering a new market, a company must ensure access to customers through appropriate distribution channels; in a situation where these channels are limited or competitors have largely taken over them, it is necessary to offer distribution companies better terms of distributing products than those offered by companies operating in the sector so far; in the case of limited access to distribution channels, it is true that it is possible to create your own, independent channel to reach the customer, but for small companies this is usually too expensive a solution; both entering existing distribution channels and attempting to reach customers independently require additional expenditure;
- expected retaliatory actions – companies newly entering the sector should estimate how strong the reaction of competitors seeking to defend their own interests may be; although the reaction to the entry of small companies to the market is relatively small – due to the marginal impact of the introduced products on the entire sector – it is worth analysing certain factors that indicate this strength in order to minimise the risk; in this context, it is advisable to analyse:
  - past behaviors used towards new competitors,
  - the level of consolidation of companies operating on the market so far, their taking of solidarity actions towards new competitors,
  - resources of existing companies allowing for the introduction of retaliatory measures,

[17] S. Skrzypek-Ahmed, K. Ćwik, W. Cwynar, S. Skowron, B. Mróz-Gorgoń, Optimisation models and the economics of managerial decision-making, „Journal of Modern Science" 2023; 54(5).

  - the level of involvement of companies in the sector (specialist companies take more decisive retaliatory action than companies operating in many different markets),
  - liquidity of resources invested by companies operating on the market so far – if the resources of these companies cannot be used in other types of activities, then radical retaliatory actions can be expected from them,
  - the pace of growth of the sector – in sectors where demand is zero or very limited, the emergence of another competitor is met with a solidary reaction from the companies operating so far, which do not agree to lose demand to the new company. The existing network of cooperation, the strength of the relationships between suppliers and recipients may also play a role here, which may block access of new companies to distribution channels and sources of supply;
- scale of capital needs – entering the sector usually requires incurring certain capital outlays related to expenditure on production, advertising, research and development, loans for customers, inventories, covering potential losses; in this case, companies entering the sector are in a much more difficult situation than companies operating in the sector; moreover, in the case of operations on foreign markets, there is a need to incur extraordinary expenditure on:
  - transportation of products,
  - delegations,
  - communication,
  - translations,
  - legal and other analyses,
  - maintaining representation;
- state policy – the state may create entry barriers through requirements for obtaining a license to conduct business or a concession for the exploitation of raw materials; standard instruments of economic policy (including environmental standards, safety regulations) will have a milder effect. The entry barriers presented are not permanent. They change over time as a result of both external conditions (changes in state policy, expiration of patents, etc.) and internal conditions (the company pursuing an energetic promotional policy, incurring high expenditures on research and development). Foundations of establishing a company's strategy For every company, but especially for a small company, it is important to precisely define the pillars on which the company's future will be based. There are three main sources of the company's strategic position, which are based on:
  - specific products or services,
  - precisely defined customer expectations,
  - established ways of reaching customers.

International marketing in the context of export internationalization

The goals set in the export marketing strategy must relate to expansion into a precisely defined foreign market. There are five basic strategic goals in export, which can be the main ones for the other goals:

1. Profit – setting a target in the form of export profit can be expressed as a sum or a percentage.
2. Market share – the percentage share of exports of a specific product in total sales in a given market.
3. Sales volume – can be expressed in value or quantity, treated as a goal and at the same time a measure of control over the implementation of the adopted marketing strategy (it allows determining the amount of profit and the exporter's share in the market).
4. Growth – may concern various aspects of export activities such as profit, sales, employment, etc. (the objective may be defined as e.g. increase in export profit, increase in employment, etc.).
5. Creating an export product – a qualitative goal, difficult to translate into a numerical value. When creating an export product, we strive to ensure that competitive products are not perceived as substitutes that can satisfy the customer.

The degree of precision of export goals depends on the level of the strategic document, which is the export marketing strategy. The larger the company, the less precise the goals are and cover a larger area and broader target groups. Correctly identified export goals should meet the criterion referred to as the SMART acronym:

- Specific – should be specific;
- Measurable – should be measurable;
- Acceptable/ambitious – should be acceptable, achievable, ambitious;
- Relevant/realistic – they should be real and achievable;
- Time-bound – should be achievable within a specified time period.

Exporter's guides recommended by international organizations such as OECD or the World Bank[18], recommend specifying the objectives based on an analysis of the answers to the following questions:

- What we offer, for whom, for which group (age criteria, wealth criteria, etc.).
- Where, in what area, in what territory (country, region, subregion).
- How much, what will be the value of exports (quarterly, annual sales).
- From and until when (start of export sales, assumed period of export activity in a given market).

Adoption of export targets should be preceded by an analysis of the possibilities of achieving them with the available human, financial and production resources and specific external and internal conditions. Fulfilling this condition requires using the

[18] J. Z. Kusek, R. C. Rist, Ten Steps to a Results-Based Monitoring an Evaluation System. A Handbook for Development Practitioners, The International Bank for Reconstruction and Development / The World Bank, Washington 2004.

experience and knowledge of those planning export in the scope of cause-and-effect relationships between the undertaken pro-export activities and the implementation of the assumed goals. This is about the so-called theory of change, which can be described as follows: „if we use the available inputs, implementing specific activities, we will achieve specific products and thanks to this the desired change will occur"[19]. After correctly identifying export goals, you can move on to the next stage – selecting indicators. Indicators at the level of goals should be result indicators, i.e. they should reflect the direct effects of implementing the export development strategy consisting in the increase in export volume, value of trade, change in customer attitudes towards the goods and services offered, etc. In the export development strategy document, in addition to result indicators, you can also present product indicators, which usually refer to the amount of goods and services produced and sold[20]. As in the case of the principles of constructing goals, the evaluation criteria for indicators are often referred to by acronyms (e.g. SMART). Target values of result and product indicators (targets) are quantitative export goals expected to be achieved within a specified time frame using existing resources. Their establishment not only allows monitoring of the timeliness of achieving the intended goals, but also motivates action and ensures control of responsibility and transparency of the actions taken. Reliable setting of target values in export is one of the most difficult tasks in the process of creating the logic of the system for monitoring the achievement of goals. This fact is caused by both objective issues related to the imperfection of scientific methods, as well as subjective ones. Sometimes, in order to obtain immediate profits, in the process of estimating target values, there is a temptation to set easy-to-achieve goals or invent unrealistic values. There is a whole range of variables of a different nature that affect the setting of target values in export. Awareness of this fact and their reliable analysis is the basic condition for correct estimation.

Factors influencing the setting of planned export targets include in particular:

- precise goal setting / definition;
- market trends (impact indicators);
- stability of unit costs (impact on the product indicator);
- the level and structure of financial outlays, including the cost of material and personal resources (real cost of the intervention);
- type of indicator (product indicators are easier to estimate than result indicators);
- duration of the action – the shorter it is, the easier it is to make estimates, the lower the risk of the impact of unforeseen factors;
- the type, size and degree of complexity of the activity – for example, it is easier to estimate the products and results of a simple intervention consisting in increasing the volume of exports than an intervention aimed at improving the position of the company/product on a given market;
- consumer expectations, social expectations;

[19] T. Kot, A. Weremiuk, Indicators in strategic management, MRR, Warsaw 2012.

[20] Ex-post evaluation. Research theory and practice, Polish Agency for Enterprise Development, Warsaw 2007.

– external factors that may influence the actions taken, e.g. unforeseen economic turmoil in the world.

In practice, setting planned export targets is used to:

– result and impact indicators – at the strategic and program level, a method of extrapolating market trends adjusted for the impact of the intervention estimated on the basis of benchmarking and expert assessments resulting from market research;
– product indicators – in addition to expert assessments and the results obtained by similar companies (benchmarking), it is helpful to calculate the so-called unit product costs, i.e. the average cost of producing a given product.

Practice shows that these costs often differ significantly, so it is recommended to verify them in more detail, taking into account all conditions (e.g. labor costs, raw material costs, transportation and customs costs, advertising costs, costs of adaptation to the conditions and expectations of customers on a given market, etc.). The criteria related to methodological correctness require that the indicators:

– limited the possibility of presenting apparent effects;
– limited the possibility of distortion;
– enabled unambiguous and intuitive interpretation of the scale and direction of changes;
– were methodologically sound and statistically reliable.

An example of showing illusory effects may be presenting only the product indicator without taking into account the result indicator in the form of the value of exported goods. On the other hand, an example of an indicator that is difficult to interpret is the percentage of use of manufactured goods in export. A high share of export in the total value of production may indicate a high level of export as well as a low volume of goods production. On the other hand, a low level of export may indicate overinvestment in the production of non-exportable goods. Before making a decision to start exporting, an entrepreneur should answer the question of whether the company is prepared to start this type of activity and whether it has sufficient knowledge, skills and staff necessary to carry it out.

The potential exporter must therefore obtain confirmation that:

– has a strong position on the domestic market – it is a good measure of the company's characteristics, e.g. management effectiveness;
– has competences in the field of export (it employs people educated in the field of foreign trade, with experience in cooperation with foreign companies and knowledge of foreign languages);
– customers are satisfied with the products he offers;
– customers are served quickly and competently, which proves that the company structure is adequate to the tasks and that the staff is properly selected;
– customers recommend its products to their friends, which may indicate good PR and effective advertising;
– his company respects its obligations – responsible treatment of clients and business partners is the key to obtaining good contracts abroad;

- his company has excess production capacity, which means it can meet the demand of a new market and often decides to establish cooperation with a foreign partner;
- his company has access to raw materials and free financial resources;
- the profitability of another market is higher than that of the primary market;
- knows the markets where the product is attractive (in terms of price, quality, technology);
- noticed an opportunity in the market that will be or is in a phase of dynamic growth in a given industry;
- the impact of direct competition on the target foreign market is not too strong and does not prevent export;
- increasing the scale of production will significantly improve the efficiency of the enterprise, e.g. the unit cost of production will decrease;
- export will increase the company's prestige in current markets;
- entering new markets will increase sales stability;
- the life cycle of the company's products, which are in a phase of decline on the main market, will be extended.

Distribution is the distribution of products from the producer to the final buyers. Organizing distribution involves selecting and motivating sales intermediaries, maintaining inventories, organizing transportation, and storing products. A distribution channel is a group of interconnected companies, institutions, and agencies that direct the flow of products from producers to buyers. Distribution channels for industrial products are usually shorter than distribution channels for consumer products and therefore less costly. The process of creating a distribution channel involves selecting intermediaries and defining the scope of their authority and responsibility. Creating a distribution channel for goods and services involves considering two issues: choosing the location of the intermediary and choosing the form and scope of service provision.

Direct channel consists of two levels – the manufacturer and the final buyers. In such a channel there are no intermediary entities, the manufacturer reaches the final buyers with the goods at its own cost and risk, establishes trade relations with them directly (e.g. through a network of its own stores, online sales). The organization of a direct distribution channel requires the manufacturer to invest in a second, different type of activity. In practice, it may consist in the development of its own trade network or the capital integration of the manufacturer with companies operating in the trade sphere through their purchase, merger, establishment of a company, etc. Direct channels dominate the market for capital goods and raw materials. Machines, devices, tools, often non-standard and customized to individual needs, are used for a long period of time and have high prices. Sometimes the lack or reluctance of intermediaries to take on the risk associated with introducing industrial goods to the market and selling them forces their producers to use direct distribution channels, especially when these goods have innovative features.

The advantages of these channels are that they provide:
- full manufacturer control over the sale of manufactured products, prices, and the level of services provided to final buyers;
- fast, direct, two-way flow of market information between the manufacturer and customers;
- the ability to quickly adapt the offer to changes in demand in the market segment served;
- the possibility of shortening the flow time of products from manufacturers to final buyers;
- relatively faster flow of payments for purchased products;
- the possibility for the manufacturer to achieve higher profits from direct sales of products;
- the ability to establish direct and lasting relationships with customers, building a group of loyal buyers;
- greater opportunities for branding and testing new products.

The disadvantages of using direct channels by manufacturers include:
- the need to bear distribution costs and sales risk;
- limiting the scope of market penetration to the capacity of one's own distribution network (sales agents, branches);
- the need to expand the structures of the production enterprise to include a commercial segment;
- delayed effects of building cost – and time-consuming relationships with customers (costs of leasing or purchasing retail space, sales staff costs, training, business trips, telephones, commissions, advertising, stock storage, etc.). The evaluation of direct distribution channels shows that they are not always a cheaper solution, because the integration of production and distribution in one company generates additional costs.

Intermediate channel consists of the manufacturer, intermediaries and final buyers. An intermediary in the distribution channel is a natural or legal person who helps transfer the ownership of the product to the final buyer. Intermediaries, according to the criterion of their participation in the flow of ownership, are divided into:
- intermediary merchants who take over ownership of the products (importers, wholesalers, retailers);
- intermediaries-agents who do not buy products but try to link purchase and sale transactions (agents, brokers).

The share of individual intermediaries in the distribution of export products depends on the sum of the benefits they provide to suppliers and recipients. Intermediaries in the distribution channel perform the following functions:
- transactional – they deal with negotiating the terms of export contracts, concluding sale and purchase transactions, and transferring ownership title;
- logistics – deal with ordering products, organizing deliveries, storage, sorting, transport, customs clearance;
- auxiliary – collect market information, examine demand, settle and credit export transactions.

Indirect distribution channels dominate consumer product markets, especially the food market. The tasks of intermediaries in these channels include transforming the production assortment into a commercial assortment, ensuring continuity of sales and freedom of choice of goods to buyers, offering them products in conveniently located outlets. Indirect channels also occur in the service market. This is determined by their immaterial nature, lack of storage and transport requirements, poor susceptibility to standardization and the personal nature of their provision. Indirect channels occur to a lesser extent in the industrial product market. Intermediaries are primarily agents and wholesalers called distributors. The advantages of indirect distribution channels can be identified by determining the benefits that the exporter gains from the involvement of intermediaries. Using intermediaries in export:

- increases market penetration and potential product sales;
- facilitates the exporter's expansion into new, previously unserved markets;
- reduces the number of transactions with end buyers, which lowers distribution costs;
- allows you to benefit from the intermediary's specialization;
- it frees the exporter from incurring costs related to finding buyers, building its own sales network, employing sales staff, and maintaining inventories;
- reduces the exporter's risk by part of the liabilities transferred to the intermediary;
- releases the exporter from performing activities aimed at adapting the products to the needs of the final buyer (e.g. packaging).

The disadvantages of indirect distribution channels in export include:

- partial or complete loss of direct control over the selection of final buyers, prices, promotions, after-sales service, quality of customer service;
- extended payment period, which means crediting the intermediary;
- greater possibility of conflicts arising;
- negative consequences resulting from the intermediary's failure to fulfil its obligations, ignoring the exporter's expectations, low qualifications of sellers, etc.

Conclusions

At the company level, export marketing strategies are most often described as forms of entry into a foreign market in a marketing context, conditioning the long-term activity of the company in a given market. Export marketing strategies are also defined as „ways of fulfilling the company's market intentions in the target market, which should ensure effective allocation of resources and implementation of coherent marketing activities in order to achieve the goals of the company as a whole in a given market or in the context of a specific product". The chosen export marketing strategy determines the methods and possibilities of controlling the company's marketing operations conducted outside the country's borders. In practice, we understand the export marketing strategy as a carefully selected set of activities by which the company wants to achieve its strategic goals in new markets. The goals may concern introducing goods or services to them, increasing the company's share in a given market, increasing profits and/or

building a positive image of the company. Considering the attractiveness of the market and their competitive position, companies adopt one of three export marketing strategies: expansion, selective development or exploitation and withdrawal. The choice of the right export strategy will determine the market success and the long-term development prospects of the company. The key issue is not whether the company should enter foreign markets, but how and when to take the first step. As the Chinese proverb says: Even the longest journey begins with a single step.

Context Marketing – providing content tailored to the expectations of potential buyers at the right time, through the right channel. Export marketing strategy – the process of defining long-term goals and intentions of the organization and adopting directions of action, as well as allocating resources necessary to achieve these goals. Export marketing strategy should be an element of the company's development strategy describing the goals, position and capabilities of the company on the domestic and foreign markets, each of the company's goals is related to gaining an advantage over the competition. The more advantages, the greater the chance of implementing the strategy and export success. Export marketing strategy is a catalog of activities that condition and make export success probable, it describes the process of gaining an advantage over the competition consisting in offering contractors more favorable conditions for purchasing goods and services. Advantages over competitors are primarily related to price, quality, delivery terms and conditions, guarantees, service, etc. Export marketing strategy is also a set of professionally selected tools and methods for gaining competitive advantage in a given period, taking into account the potential and market phenomena, facilitates the optimization and monitoring of managerial decisions, enables monitoring and evaluation of processes related to the implementation of export. Export marketing strategies based on contracts do not require a large involvement of capital resources, because they are based on long-term agreements with foreign partners, covering various forms of cooperation. It is worth remembering that contract strategies also include the possibility of selling licenses and management contracts. Export marketing strategies requiring capital involvement include:

- organization of own sales network on the foreign market;
- merging enterprises into mixed companies (joint ventures) with the intention of conducting joint operations;
- foreign direct investment (FDI).

Bibliography

Ball D., McCulloch W. H., International Business – Introduction and Essentials, Addison-Wesley Publishing Company, New York 1991.

Cieślik J., Entrepreneurship, politics, development, Academic Publishing House SEDNO, Warsaw 2014.

De Wit B., Meyer R., Strategy Synthesis, PWE, Warsaw 2007.

Ex-post evaluation. Research theory and practice, Polish Agency for Enterprise Development, Warsaw 2007.

Gorynia M., On the classification of sciences dealing with international economic activity, [in:] Globalization and regionalization in the world economy. Jubilee book of Professor Jan Rymarczyk, Skulska B., Domiter M. (ed.), Warsaw 2012.

Griffin R. W., Pustay M. W., International Business. A Managerial Perspective, Pearson Prentice Hall, New Jersey 2007.

Kot T., Weremiuk A., Indicators in strategic management, MRR, Warsaw 2012.

Koźmiński A. K., International Management, Polish Economic Publishing House, Warsaw 1999.

Kusek J. Z., Rist R. C., Ten Steps to a Results-Based Monitoring an Evaluation System. A Handbook for Development Practitioners, The International Bank for Reconstruction and Development / The World Bank, Washington 2004.

Nowakowski M., International business. From internationalization to globalization, SGH, Warsaw 2015.

Pearce C. L., Maciariello J. A., Yamawaki H., Drucker's Legacy, Wolters Kluwer, Warsaw 2013.

Rymarczyk J., International Business, Polish Economic Publishing House, Warsaw 2012.

Rymarczyk, J., Internationalization and Globalization of Enterprises, PWE, Warsaw 2004.

Skrzypek-Ahmed S., Ćwik K., Cwynar W., Skowron S., Mróz-Gorgoń B., Optimisation models and the economics of managerial decision-making, „Journal of Modern Science" 2023; 54(5).

Stonehouse G., Hamill J., Campbell D., Purdie T., Globalization. Strategy and Management, Felberg SJA, Warsaw 2001.

Szymański W., Globalization, challenges and threats, Diffin, Warsaw 2001.

Tubielewicz A., The concept of creating a network organization (in:) Innovations in production management and engineering, Knosali R. (ed.), Publishing House of the Polish Society for Production Management, Opole 2013.

Walas-Trębacz J., Globalization – premiises and challenges for enterprises operating on international markets [in:] Management of an international enterprise. Integration of Diversity, Wiktor J. W. (ed.), CH Beck Publishing House, Warsaw 2017.

Zakrzewska-Bielawska A., Internationalization and globalization and enterprise development strategies, [in:] Instruments and areas of organizational transformations and changes in the conditions of globalization, Potocki A. (ed.), Difin, Warsaw 2009.

*Jerzy Gilarowski**
*Anna Wiśniewska***
*Nghargbu K'tso****
*Hannatu Umar*****
*Agnieszka Lamb******

ECONOMIC DETERMINANTS OF INTERNATIONAL ENTREPRENEURSHIP – GLOBALISATION AND GLOBAL BUSINESS

Ekonomiczne uwarunkowania przedsiębiorczości międzynarodowej – globalizacja i biznes międzynarodowy

*PhD., Assoc. Prof., University of Dar Es Salaam Mkwawa University College of Education, Tanzania, ORCID: 0000-0002-9516-0554

**PhD., Assoc. Prof., Academy of Finance and Business Vistula in Warsaw, ORCID: 0000-0003-0876-1763

***PhD., Prof., Director Linkages & International Cooperation, Nasarawa State University Keffi in Nigeria, ORCID: 0000-0002-6320-6722

****PhD., Assoc. Prof., Federal University Lafia in Nigeria, ORCID: 0009-0004-4926-7934

*****WSEI University in Lublin, student

Streszczenie

Przedsiębiorczość to określona cecha działania zmierzającego do zapewnienia racjonalnej i efektywnej koordynacji zasobów gospodarczych firmy. W praktyce pojęcie przedsiębiorczości należy rozumieć jako formę pracy lub jako dodatkowy czynnik produkcji. Główne cechy działania przedsiębiorczego to skłonność do ryzyka i umiejętność dostrzegania nisz rynkowych i zaspokajania popytu, a także zdolność do wykorzystywania nadarzających się okazji. W tym kontekście przedsiębiorczość należy traktować w ujęciu innowacyjnym. Innowacje w przedsiębiorczości to istotny czynnik sukcesu rynkowego, szczególnie w warunkach globalizacji internacjonalizacji procesów biznesowych. O przedsiębiorczości można mówić w wymiarze zarówno procesu działań ukierunkowanych na tworzenie czegoś nowego (modyfikowanie, zmiana itp.) poprzez podjęcie określonego ryzyka oraz zdolność do wykorzystywania pomysłów (okazji itp.), jak i pewnego zespołu cech osobowych (dynamika w działaniu, aktywność, innowacyjność, skłonność do ryzyka itp.).

Słowa kluczowe: *ekonomia międzynarodowa, globalizacja, przedsiębiorczość międzynarodowa, biznes międzynarodowy efektywność, procesy biznesowe*

Summary

Entrepreneurship is a certain feature of activity aimed at ensuring rational and effective coordination of economic resources of the company. In practice, the concept of entrepreneurship should be understood as a form of work or as an additional factor of production. The main features of entrepreneurial action are a willingness to take risks and the ability to see market niches and meet demand, as well as the ability to take advantage of opportunities. In this context, entrepreneurship should be treated in terms of innovation. Innovation in entrepreneurship is an important factor of market success, especially in conditions of globalization and internationalization of business processes. Entrepreneurship can be talked about in terms of both a process of actions aimed at creating something new (modifying, changing, etc.).

Key words: international economics, globalisation, international entrepreneurship, international business, efficiency, business processes

Introduction: International trade - globalization and the entrepreneurial process

The issue of international trade is undoubtedly one of the most important foundations of contemporary internationalization and globalization processes. However, before they appeared, other events had to take place, the cumulative effects of which led to the formation of today's structure of the world economy understood as a specific system of connections between the main actors of international economic relations, i.e. international organizations, states and enterprises / corporations. Therefore, before starting the analysis of current problems, it is worth making a synthetic indication of the most important issues in modern economic history related to the issues of international trade. Man as an economic being, motivated to act by his needs, constantly strives to satisfy them. According to the concept of homo oeconomicus, which is fundamental to microeconomics, people rationally strive to maximize their own satisfaction (also recognized in terms of utility) and achieve it using solutions that are optimal from the point of view of rationality. Exchange (however it took place – on the basis of barter or through money) made it possible to obtain the desired goods. At the same time, it became a factor stimulating specialization, without which it would not be possible to increase production and, consequently, also the number of purchase and sale transactions. Thus, the larger and more diversified supply of new goods created new needs, which translated into a steadily growing demand, which stimulated further growth in production and the exchange itself. Exchange (however it took place - on the basis of barter or through money) made it possible to obtain the desired goods. At the same time, it became a factor stimulating specialization, without which it would not be possible to increase production and, consequently, also the number of purchase and sale transactions. Thus, the larger and more diversified supply of new goods created new needs, which translated into a steadily growing

demand, which stimulated further growth in production and the exchange itself. Exchange (however it took place – on the basis of barter or through money) made it possible to obtain the desired goods. At the same time, it became a factor stimulating specialization, without which it would not be possible to increase production and, consequently, also the number of purchase and sale transactions. Thus, the larger and more diversified supply of new goods created new needs, which translated into a steadily growing demand, which stimulated further growth in production and the exchange itself[1,2,3,4,5,6].

Any country with a market economy cannot pursue a closed economy without participating in the international division of labor (without international specialization and cooperation). The most essential element of the international division of labor is foreign trade, i.e. international national exchange. Trade in goods and services between countries has a major impact on the health of the world economy. It is the situation on the global market that determines the wealth or poverty of many millions of people. international is the total value of exports and imports to individual countries, often the term is used interchangeably with the term: foreign trade. International trade is an important factor dynamizing the overall economic development, it ensures a constant supply of the necessary raw materials, agricultural produce, cooperative goods and technology. The basic forms of cooperation with foreign countries are trade in goods (import, export, re-export) and the so-called "Invisible turnover" (tourism, transport services, postal and telecommunications services, loans). The comparison of the value of exports and imports is the country's trade balance. The balance sheet with the invisible turnover is the country's balance of payments.

International trade

International trade despite the progressing globalization, it is still one of the main links between the economies of individual countries and the world economy. Therefore, the knowledge of the laws and rules in force in this trade over the centuries is of great importance for understanding the mechanisms that encourage growth and stimulate economic development today. International trade makes it possible to use more factors of production and to produce and consume more goods and services. Why do countries trade with each other? The answer seems to be real! Countries trade to obtain products and inputs that they themselves cannot and cannot produce.

[1] P. Czubik, Free trade in goods. International law foundations of commercial regionalism, Kantor Wydawniczy Zakamycze, Kraków 2002.

[2] A. Gwiazda, Globalization and regionalization of the world economy, Adam Marszałek Publishing House, Toruń 2000.

[3] C. Jean, Geopolitics, Zakład im. Ossolińskich, Wrocław 2003.

[4] J. Sołdaczuk, History of international trade. Zarys, Private University of Economics, Warsaw 1995.

[5] J. Rymarczyk, M. Wróblewski, Non-European integration groups, Oficyna Wydawnicza Arboretum, Wrocław 2006.

[6] W. Malendowski, C. Mojsiewicz, International Relations, Atla 2 Publishing House, Wrocław 1998.

But this answer only reveals a glimmer of reality! Of course, some goods and production factors are physically unattainable, e.g. in Poland we do not have conditions for growing coffee or tea. If we want this good, we have to import them. The absolute benefits are that a country is more efficient at producing a given good than another country. The comparative advantage is that one country can produce a given good at a lower opportunity cost than another country. Countries that trade with each other export those goods in the production of which they have comparative benefits and thus gain benefits. Each country makes purchases at a lower price than what it would have to pay if it produced the good itself. Countries have more products due to international trade than if they produced both at home. International trade therefore benefits both sides that one country can produce a given good at a lower opportunity cost than another country. Countries that trade with each other export those goods in the production of which they have comparative benefits and thus gain benefits. Each country makes purchases at a lower price than what it would have to pay if it produced the good itself. Countries have more products due to international trade than if they produced both at home. International trade therefore benefits both sides that one country can produce a given good at a lower opportunity cost than another country. Countries that trade with each other export those goods in the production of which they have comparative benefits and thus gain benefits. Each country makes purchases at a lower price than what it would have to pay if it produced the good itself. Countries have more products due to international trade than if they produced both at home. International trade therefore benefits both sides Countries have more products due to international trade than if they produced both at home. International trade therefore benefits both sides Countries have more products due to international trade than if they produced both at home. International trade therefore benefits both sides[7,8,9,10,11,12].

Until recently, it was traditionally perceived as the domain of large corporations. It is the international expansions of American, European and Japanese giants that have led to the incredible concentration of global economic potential. A global enterprise is one that sells its products and services worldwide, has an international sales network and production equipment that enables it to gain a competitive advantage through the use of operational scale and technology across the globe. Today, the 800 largest non-financial companies in the world make up approx. 50 percent. world

---

[7] D. R. Kamerschen, R. B. McKenzie, C. N. Nardinelli, Ekonomia, Economic Foundation of NSZZ "Solidarność", Gdańsk 1991, p. 853-876.

[8] D. Begg, S. Fischwer, R. Dornbusch, Ekonomia, PWE, Warsaw 1992, p. 382-412.

[9] S. Duda, J. Kuśpit, H. Mamcarz, A. Pakauła, H. Żukowska, M. Żukowski, Outline of Economics, UMCS, Lublin 2003, p. 313-332.

[10] R. McConnell, Economics, McGraw-Hill Book Company, New York 2000, p. 831-893.

[11] P. A. Samuelson, W. D. Nordhaus, Economics, McGraw-Hill Book Company, New York 2000, p. 831-856.

[12] M. Rynarzewski, A. Zielińska-Głebocka, International economic relations, Theory of exchange and foreign trade policy, PWN, Warsaw 2006, p. 231-257.

GDP. They account for 60 percent. global stock market capitalization[13]. The revenues of the 500 largest companies have fluctuated around 40 percent in recent years (2017-2019). the production value of the entire global economy. The development of a free market economy, capital markets and the gradual removal of barriers to international trade helped the companies to build a global power. After the collapse of the Soviet bloc, the pro-market transformation of China and the end of many undemocratic regimes from the Third World, the free market became the basic models for the functioning of countries in the world. When looking for money for investments, both for acquisitions of competitors and innovations, companies went to the stock exchanges. The basic goal of the company's operation, generating profit, has been multiplied in this way – investors in the capital markets expect a constant, long-term improvement of the condition of the company in which they invest. So, above all, growing revenues and stable profits. This prompted companies to look for, inter alia, ways to reduce costs, and free trade enabled them to search for them on a global scale (relocation of production, global logistics, tax optimization, etc.). The larger the scale of operations, the greater the chances of maintaining stable profits. International corporations continue to develop dynamically, constantly taking over smaller competitors. The number of companies listed on Wall Street has been declining for 20-30 years, while average stock market capitalization has been growing faster than the economy.

For example, there is a consolidation of companies from the same industry or related industries (e.g. in the pharmaceutical industry Ciba-Geigy and Sandoz, GlaxoWellcome and SmithKline Beecham, food – Bestfoods and Unilever, telecommunications – Ameritech and SBC), but intersectoral connections with with the goal of creating global multimedia companies (combining "classic" media and the Internet, such as America OnLine and Time Warner or Vodafone Air Touch and Mannesman). The success of the merged companies is primarily determined by technological competences, the level of innovation and management. Therefore, one may be tempted to say that the contemporary processes of internationalization and globalization of the economy are guided by the largest corporations.

There is no relief, therefore, of the doubts that globalization leads to the realization, for the first time in the history of mankind, of the principle of economic liberalism, which states that everything can be produced and sold anywhere in the world, and that it is possible to perform every component and every activity in a place on the globe where you can do it the cheapest, and you can also sell it where the price and profit are highest. This leads to a progressive internationalization of production and service capital and the expansion of cross-border enterprises, especially transnational corporations. This process takes place in conditions of fierce competition for the location of management, capital and production centers[14]. There is also a lack of a world center of power that could regulate and influence both the management of corporations and the social and economic activity of states. Hence the awareness that

[13] https://www.rp.pl/Plus-Minus/303029949-Koncerny-silne-jak-panstwa-Kto-rzadzi-swiatem.html.

[14] G. Stonehouse, J. Hamill, D. Campbell, T. Purdie, Globalization. Strategy and Management, Felberg SJA Publishing House, Warsaw 2001.

corporations should take greater responsibility for the social and economic effects of their activities[15]. At the same time, the long-term process of regional and global economic integration as well as the requirements of contemporary competition on international (global) markets force companies to establish various forms of international cooperation based on common goals and to create 206 international teams. The aforementioned integration processes occur most often in horizontal and vertical relations between enterprises. The horizontal integration contributes to the achievement of the economies of scale of market power, and the vertical integration increases the security of supply with production factors and sale of products[16].

State management in modern times is a constant struggle to balance revenues and expenses. Education, healthcare, police, army – everything costs dearly. Virtually every country in the world has to deal with a budget deficit from time to time.

For most countries, it is a permanent state. Even in affluent Europe, a surplus is rare – last year only Germany, Luxembourg and Estonia were positive among the EU countries. However, the surpluses of the latter two small countries were symbolic. Germany, considered to be the Croesus of Europe, has been down by 2.1 percent on average over the last 20 years. GDP[17]. The 3% deficit threshold is considered critical for the long-term sustainability of public finances. GDP, and enshrined in EU treaties as the maximum, is regularly exceeded by a group of six to eight countries, including Poland. We are in good company – with France, Great Britain and Spain. In other words, states still need money to meet their obligations to their citizens. The situation is completely different in the case of companies that do not have social obligations. The world's 500 largest companies had $ 1,5 trillion in 2015. profit. Almost 250 times more than Berlin's budget surplus last year. Their revenues were almost 20 times higher than the revenues to the German state treasury. To finance deficits, states get into debt. Various estimates show that approx. 30-40 percent. from $ 60 trillion the debts of all countries in the world are in private hands, mainly financial institutions. So, in a sense, states have become permanently dependent on corporate money.

Concerns are able to use their economic advantage in contacts with states. Their investments usually mean thousands of jobs. Politicians who sit down with them to negotiate are well aware that attracting a wealthy investor will be treated as their success. After all, the families of those who found work are potential voters. A politician has to be popular. Corporations have soft blackmail. Building a factory in a given country often depends on meeting certain conditions. It is most clearly visible in automotive investments. For over a dozen years, the Czech Republic, Poland, Slovakia and Hungary have been competing for money from investors in this industry. In each case, national governments and local authorities bore the costs of building infrastructure, long-term tax breaks, and even direct state aid. A spectacular example from recent years is the investment of Tata Motors, which is building a factory in

[15] C. L. Pearce, J. A. Maciariello, H. Yamawaki, Drucker Heritage, Wolters Kluwer Publishing House, Warsaw 2013.

[16] A. K. Koźmiński, International Management, Polish Economic Publishing House, Warsaw 1999.

[17] World Investment Report, 2001-2018, UNCTAD, United Nations, New York and Geneva.

Slovakia. Its value is about PLN 7 billion. During the negotiations, Poland reportedly offered around PLN 350 million in support. However, it turned out to be too little and the Indians chose the Slovak Nitra. The pinnacle of how the corporate world can influence the state was the collapse of Berlusconi's government in Italy. It was widely believed that it was due to a vote of no confidence in the financial markets. One of the most serious confrontations between corporations and states is taking place right before our eyes. The announcements of the imposition of punitive duties on the goods of American companies manufactured outside the US, Washington's withdrawal from the signed free trade agreements, and the controversial ban on the entry of citizens of seven countries to the United States arouse business concern overseas. Donald Trump exerts direct pressure on corporations, forcing them to change their business strategies, or face rather vague consequences.

Five global tech companies – Google, Apple, Facebook, Twitter and Microsoft – even sent a letter to Trump in which they suggested finding a way to deal with the influx of potential terrorists other than banning all nationals of the countries from entering the US. Uber CEO Travis Kalanick, one of Trump's advisers, even had an interview with him on the subject. However, the president's idea was also criticized by the presidents of Tesla, Amazon and Adobe. Many of them emphasized that America is a country built by immigrants, who were also their ancestors. Regardless of who is right in this dispute, such a collective protest of companies against immigration policy, which is, after all, the domain of states, is a rarity. Especially that the most frequently used form of pressure is various types of lobbying. It is sanctioned in the USA and the European Union. Last year, over 11,000 were registered in Washington. lobbyists. In the peak year of 2007, just before the outbreak of the financial crisis, there were 14,8 thousand of them. Officially recorded lobbying expenditure is over $ 3 billion. annually. In Brussels, they are estimated at around EUR 1 billion a year. Open and hidden lobbying is possible thanks to the increasing interpenetration of business and politics. A certain level of competence regarding the functioning of the economy and the world of finance is impossible to achieve without business experience. The more that it means extensive contacts, currently popular networking, so important in today's career-oriented times. The positions of economic and financial ministers in developed countries are usually occupied by people who have had a successful career in large corporations. The most spectacular example is the function of the American secretary of the treasury, which for decades has not been performed by anyone who has not worked for financial institutions. In her case, the Goldman Sachs investment bank is the source of human resources for the White House. This bank contributed significantly to the recent financial crisis in the US, as evidenced by, for example, last year's agreement with the Department of Justice worth $ 5,6 billion. Paradoxically, the former president, Henry Paulson, who worked for 30 years for Goldman, as the secretary of the treasury, had to extinguish the fire caused by his institution. And the fire was extinguished mainly by "printing dollars", that is, at the expense of the federal government. However, this did not prevent Trump from appointing another former Goldman banker – Steve Mnuchin.

There are visible attempts by corporations to insert their representatives into the democratic system. Sooner or later, such a man will represent the corporation, he emphasizes, and points out that the United States is no exception. Similar pathologies are seen in various European countries. In Europe, the most famous of them was the fact that Gerhard Schroeder took up a high position in the council of Nord Stream, controlled by Gazprom, years ago. Until the end of his term of office, the former German chancellor lobbied for the construction of the Nord Stream gas pipeline, an investment for which his government provided a EUR 1 billion guarantee. Former European Commission president Jose Manuel Barroso joined Goldman Sachs International's board last year, just two months after his 18-month ban on corporate positions ended. Mario Monti, former EU internal market and competition commissioner and former Italian prime minister, has already been an official advisor to both Goldman Sachs and Coca Cola. He is also a member of the Bilderberg Group, considered by fans of conspiracy theories as an institution unofficially governing the world. His successor as the EU commissioner, Neelie Kroes, worked, among others for Merill Lynch, McDonald's and Lucent telecommunications concern. Last year, the International Consortium of Journalists revealed the so-called Panama Papers, which showed that, simultaneously with serving in the European Commission, Kroes was the president of Mint Holdings, a company registered in a tax haven in the Bahamas. EU law prohibits combining the function of a commissioner with any other director position. Kroes explained that she was "overlooked". It is more and more difficult to imagine someone who has been a politician throughout his career. This is due to, among other things, the dictate of money, manifested in the domination of large companies on the labor market. It is international corporations that extract the strongest brains from universities. they are only economists and lawyers.

The scale of the corporation's operation, the costs they are willing to incur in the name of future profits, make them able to guarantee high earnings and career paths leading to life well-being for the best. In the long run, states are unable to compete with them. Concerns are also able to pay enormous money for names, often made in the political arena. It has been accepted that politicians also have to work somewhere. So it is more and more difficult to determine whose interests they represent. In the most economically developed countries, politics is slowly becoming the domain of fans of power, fame, people who want to use several years of presence in the government to find a highly paid job or still idealists. The monopoly on the best minds translates into domination in particular areas of knowledge. These are not only the aforementioned finances and broadly understood economics. – Corporations have dominated recently mainly in the field of technology, influencing societies. States have little influence in these areas. Corporations deal cards in industries such as transport, medical technology, and IT. And these are the areas that structure the life of the planet in the next decades. The biggest concerns in the world are technology companies. The same ones that have recently challenged Trump's policies. And without technical knowledge, it is not only difficult to understand the modern world, but also increasingly difficult to live in it. – By slimming, governments got rid of

technical knowledge. Therefore, when it comes to technical issues, contacts between states and corporations are becoming more and more difficult. Some countries want to reverse this trend. Until now, the guardians of citizens' security were states, having a monopoly on the coercive apparatus – be it in the form of the police or the army. They collected information about us necessary, for example in civil and legal relations – address of residence, date of birth, marital status and many others. The digital revolution has completely changed the conditions of the game. It is technology companies that collect gigantic amounts of data about us. They know the most about our preferences or behaviors. They also often come into possession of personal data. For years, Facebook forced the owners of profiles to use their own names on the portal. Those who did otherwise were kicked out of this community. At the same time, the company tried to obtain data that would allow it to expand the profile – from the date of birth to the telephone number. Due to technology, legislation that tries to cover, for example, civil rights is delayed by up to several years. Seems, that the advantage of knowledge, talent and economic power lies with the concerns. Corporations also seem to be more efficient organizations than governments. – Their decision-making process is much faster – says Eryk Mistewicz. Compared to nation states, corporations are more creative. They quickly put their decisions into effect. They have less resistance because they operate under less social control than in the case of states.

The higher efficiency is also, to some extent, due to technology. Concerns not only collect a lot of information, but are also able to quickly process and analyze it. Adding to this the communication revolution that we have witnessed for two decades, mainly due to the Internet, managing large organizations has become easier. The Internet enables remote management, while data analysis speeds up the decision-making process. As long as you have the resources to do so. Thanks to technologies, it is also easier to manage such a large company. This made it profitable to integrate larger and larger companies. It's not that corporations don't have their weaknesses. The most important thing is impermanence. The existence of states is interrupted by wars, the lives of companies do not keep up with the market. The latter is much more common. Capitalism is changing a lot. Not all companies are able to adapt to this efficiently. The ground under their feet is also burnt for corporations from time to time. Their power depends on the consumers who buy their goods. In addition, corporations, apart from pathological price collusion, do not cooperate with each other so willingly. For this to be the case, they must have a common business goal, and often they are just competitors. They rarely work together because they usually have conflicting interests. The interests of Facebook and Google are usually conflicting. Who will be the winner in this century-long test of strength? Recent years have seen an ever stronger awakening of nation states. Contestation of globalism, and thus global business, has moved from the debates and protests of anti-globalists to the level of real politics. Under pressure from groups of citizens who consider themselves excluded from the race for prosperity, politicians are increasingly promoting isolationist slogans. This is favored by the growing stratification of income - in a system in which it is easier to multiply capital than build it on income from work, the wealthiest 10 percent.

societies get richer faster than the remaining 90%. And most of the revolutions in human history, both bloody and bloodless, have been caused by a sense of economic harm. Almost sure Brexit, that is, the exit of Great Britain from the European Union, the possibility of Frexit, i.e. the identical situation in France, harsh criticism of international trade from its largest player and beneficiary, i.e. the United States, are the results of the awakening of national interests. They are in conflict with the interests of international companies. However, they were coupled with the interests of states. Less international trade cooperation means not only lower corporate profits, but also a deterioration in the fiscal position of many countries. They also benefit from this trade They are in conflict with the interests of international companies. However, they were coupled with the interests of states. Less international trade cooperation means not only lower corporate profits, but also a deterioration in the fiscal position of many countries. They also benefit from this trade They are in conflict with the interests of international companies. However, they were coupled with the interests of states. Less international trade cooperation means not only lower corporate profits, but also a deterioration in the fiscal position of many countries. They also benefit from this trade[18]. The current legal status of concerns neither reflects social needs nor their global status. The only right way seems to be to create the status of a company that takes into account the social responsibility of companies, as well as responsibility for the inventions they introduce, their social effects, and even the pricing policy. Due to their market position, in many cases they offer goods that can be called public goods. The alternative, in his opinion, is corporate erosion. The current paradigm of running a business is coming to an end. The fiscal pressure from states on these enterprises is high at present. As of this year, Brussels requires large corporations based in Europe to disclose the exact structure of their business. So far, we knew as much about these concerns as they revealed to us in their financial reports – he adds[19].

The essence and concept of international business and international entrepreneurship

At the end of the 1980s, scientists turned their attention to international entrepreneurship and small and medium-sized enterprises competing on the international and even global market. Already at the very beginning of the analysis of the literature on the subject, a problem can be identified with an unambiguous definition of international entrepreneurship. In most cases, it is derived from the definition of entrepreneurship itself. Then, the following directions of undertaken research can be defined. Why, how and by what means do companies cross national borders? What are the characteristics of individual enterprises? What are the patterns of entering

[18] More: T. Kaczmarek, J. Królak-Wewińska, International Trade: Risk Management. Financial settlements, Wolters Kluwer, Warsaw 2008.

[19] P. H. Dębiński, Economic and Financial Globalization. What the Numbers Say, Observatoire de la Finance, Geneva 2003.

foreign markets? How do connections and networks affect entering the foreign market?[20]. A lot of research and scientific publications have been devoted to new forms of international entrepreneurship defined in foreign literature as: born globals, born internationals or international new ventures. Despite the progress made in scientific work in the field of international entrepreneurship, many authors say that there is a need for further research[21,22,23,24,25,26,27,28,29,30,31,32,33,34,35].

The concept of entrepreneurship does not have a single definition, but nevertheless, with various attempts to create it, the economic dimension is most often revealed. J. M. Dollinger defines entrepreneurship as creating innovative business units or networks of organizations to achieve benefits or growth under conditions of risk and uncertainty. On the other hand, F. Bławat writes that entrepreneurship is one of the factors that allow one person or enterprise to operate more effectively.

International Business (BM) is characterized by a multifaceted approach to empirical phenomena. The main areas of analysis are: the activities of individual managers, enterprises, the sector and the entire environment. Each of them is characterized by

[20] M. Hofman-Kohlmeyer, International Entrepreneurship in the Light of Scientific Research - Literature Review, "Economic Studies. Scientific Papers of the University of Economics in Katowice" 2018; 352.

[21] S. Andersson, International Entrepreneurship, Born Globals and the Theory of Effectuation, "Journal of Small Business and Enterprise Development" 2001; 18(3): 627-643.

[22] M. Angelsberger, S. Kraus, A. Mas-Tur, N. Roig-Tierno, International Opportunity Recognition: An Overview, „Journal of Small Business Strategy" 2017; 27(1): 19.

[23] A. Al-Aali, D. J. Teece, International Entrepreneurship and the Theory of the (Long-Lived) International Firm: A Capabilities Perspective, „Entrepreneurship Theory and Practice" 2010; 38(1): 95-116.

[24] I. Allen, International Entrepreneurship Theory: Past, Present and Way Forward, „Entrepreneurial Business and Economics Review" 2016; 4(4): 93.

[25] N. Daszkiewicz, Internationalization of Firms through Networks-Empirical Evidence from Poland, „International Entrepreneurship and Corporate Growth in Visegrad Countries" 2001; 57: 70-81.

[26] N. Daszkiewicz, Determinants of the pace of internationalization of enterprises with particular emphasis on born globals, „Studia Ekonomiczne" 2016; 271: 7-16.

[27] E. Duliniec, Early internationalized enterprises – conditions and development, „Gospodarka Narodowa" 2011; 5-6: 1-20.

[28] E. Duliniec, Theoretical views of early and rapid internationalization of enterprises, „Gospodarka Narodowa" 2013; 21(1-2): 31-52.

[29] M. Gabrielsson, V. Sasi, J. Darling, Finance Strategies of Rapidly-Growing Finnish Smes: Born Internationals and Born Globals, „European Business Review" 2024; 16(6): 590-604.

[30] G. Gołębiowski, Entrepreneurship in Poland in the light of the Global Entrepreneurship Monitor research, „Studia BAS" 2014; 1: 9-25.

[31] M.V. Jones, N. Coviello, Y. K. Tang, International Entrepreneurship Research (1989–2009): A Domain Ontology and Thematic Analysis, „Journal of Business Venturing" 2014; 26(6): 632-659.

[32] M. Ratajczak-Mrozek, Network approach to internationalization of enterprises, „Marketing i Rynek" 2009; 3: 7-11.

[33] A. Salamzadeh, D. A. Kirby, New Venture Creation: How Start-ups Grow?, „AD-minister" 2017; 30: 9-29.

[34] K. Wach, Familiness and Born Globals: Rapid Internationalization among Polish Family Firms, „Journal of Intercultural Management" 2014; 6(3): 177-186.

[35] S. A. Zahra, A Theory of International New Ventures: A Decade of Research, „Journal of International Business Studies" 2005; 36(1): 20-28.

great diversity. Nowakowski states that international business includes transactions that are designed and made across national and cultural borders in order to meet the needs of individual buyers, enterprises and organizations[36]. It can be presented as a field in which several overlapping and partially complementary disciplines are outlined. These are: international management, international marketing, global marketing (as a subsystem of international marketing) and international finance. Shenkar defines BM as an area where general knowledge of how to do business in the international market is combined with regional know-how. Both components create a specific "knowledge platform" based on theoretical foundations and difficult to follow. General knowledge relates to such fundamental issues as international institutions, trade agreements, regional organizations, etc. As far as regional know-how is concerned, it relates to the cultural, religious, political and economic conditions of individual countries, regions. BM allows you to explain the behaviour of enterprises on local markets, taking into account the conditions just mentioned – which is an extremely important ability. Griffin and Pustay indicate that international business involves economic transactions concluded between entities from more than one country[37]. Examples include the purchase of materials and their delivery to a foreign recipient for use in production processes, delivery of finished products from one country to another for wholesale, launching an enterprise outside the country due to lower labor costs, etc. these types of transactions can be individuals, private companies, corporate groups or government agencies.

Ball and McCulloch draw attention to an important circumstance accompanying international business[38]. Namely, they emphasize that a company operating across borders must cope and be able to move in three environments - in the domestic environment of the country of origin, in the foreign environment of the country of expansion, and in the international environment. Gorynia proposes that the notion of international business in the broad sense of the word define all types of economic activity, provided that they take place between states, regardless of whether the relations concern states as a whole, industries, sectors, regions, consumers, entrepreneurs and regardless of whether they are real or regulatory relations[39]. Based on the cited definition, it states that the presence of the "international element" is the distinguishing feature of international business against the background of all economic activity. The definition proposed by Gorynia seems to be the broadest of the ones quoted above. Its advantage is drawing attention to both the real and regulatory aspects of the activities that make up international business.

---

[36] M. Nowakowski, International Business. From internationalization to globalization, SGH, Warsaw 2015, p. 19.

[37] R. W. Griffin, M. W. Pustay, International Business. A Managerial Perspective, Pearson Prentice Hall, New Jersey 2007, p. 5.

[38] D. Ball, W. H. McCulloch, International Business - Introduction and Essentials, Addison-Wesley Publishing Company, New York 1991, p. 13-14.

[39] M. Gorynia, On the classification of sciences dealing with international economic activity, [in:] Globalization and regionalization in the world economy. Jubilee book of Professor Jan Rymarczyk, B. Skulska, M. Domiter (ed.), Warsaw 2012, p. 45.

One should remember about the scale and course of globalization processes and about the planes on which these processes take place. The first is globalization, and the second is the strong, full of tensions and diversified development of regional integration processes. The aforementioned processes are at the same time fundamental challenges for international business, because entities operating in its environment have to cope with such phenomena as constant technical and technological progress, shortening of the product life cycle, increasing importance of the scale of production and sales, aggravation and emergence of new forms of competition, a huge increase in the importance of research and development and innovation, virtualization of many areas of enterprise activity and business communication[40]. Another issue that should be clarified here is the specificity of international business compared to business in general and / or domestic business. There is considerable agreement in the literature that despite many obvious similarities, the activity on the domestic (domestic) market differs significantly from the activity on foreign markets. Shenkar and Luo fall into two groups of differences between domestic and international business[41]:

- diversification and dynamics of the business environment – means that international activity is burdened with a higher risk;
- differences of an operational nature – which requires having specific competencies at both the operational and management levels.

On the other hand, Griffin and Pustay argue that the main difference between domestic and international business is that economic transactions carried out within the BM cross national borders. But there are other significant differences, among which it is worth pointing out the fundamental ones[42]:

- Countries involved in economic transactions on international markets may use different currencies, which affects the profitability and safety of operations.
- The legal systems of countries are different, which forces foreign entities to adapt their activities to local law. Sometimes the legal rules of different countries are mutually exclusive, creating problems for international managers.
- The cultural systems of the countries where the transactions are made are different, causing the local partner to expect our behaviour to be adapted to local customs.
- The resource endowment of countries is different. One country may possess natural resources but will have a poorly educated workforce, while another will have an efficient, well-educated workforce, but its natural resources will be poor. As a result, the production processes and types of manufactured products will be different in both countries.

The quoted definitions of international business indicate that this is an area of knowledge in which the main subject of interest are economic transactions carried out on the international market through the prism of individual buyers, enterprises or organizations. In turn, managers operating on this market should professionally

[40] J. Rymarczyk, International Business, PWE, Warsaw 2012, p. 25.

[41] O. Shenkar, Y. Luo, International Business, John Wiley & Sons, INC, New Jersey 2002, p. 10-11.

[42] R. W. Griffin, M. W. Pustay, International Business… op. cit.

use the conditions offered by the domestic environment, the foreign environment (in the country / countries where the company operates) and the international environment in order to create the value and potential of companies or maximize their profits, and at the same time take into account the higher risk of activity in BM in your calculations[43].

Enterprise globalization

Enterprise globalization is a multithreaded and complex phenomenon, therefore there are many definitions of this concept. Most authors use it in relation to three elements, such as: – global reach – geographical significance, means an enterprise with its operations all over the world, as opposed to local (national) or regional (several countries) enterprises; – worldwide homogeneity – disappearance of international diversity, means a company selling the same product in all geographic markets served, as opposed to a product adapted to the local specificity; – global integration – the category of dependence and strengthening international ties, means an enterprise that clearly feels the effects of events taking place in other countries, as opposed to the local market[44]. Internationalization and globalization require enterprises to apply various strategies that depend on the structure of the enterprise, the form of activity, and the geographic structure. However, it seems that these processes encourage enterprises to choose an operating strategy based more often on mergers, acquisitions and building strategic alliances with competitors, i.e. choosing an external path of growth and development.

It should be noted that the multinational and global strategy are models of an enterprise's operation in foreign markets with distinct, extreme features. On the other hand, international and transnational strategies are characterized by certain features specific to a global and multinational strategy, which results from their determinants. The transnational strategy results from the strong pressure on costs and local conditions, and the international one from little pressure on both of these factors. In the case of the strategy of internationalization of enterprises, the distinguished types of strategies often appear jointly or their hybrids. Strategies for the development of the international position of the enterprise are classified on the basis of the assessment of products and markets, and the global diversification by means of which the internationalization of enterprises is carried out is related to the diversification of sales markets.

Polish enterprises face a great challenge, which is the internationalization and globalization of their activities. Undoubtedly, taking action in this area gives companies great benefits, such as: reducing costs, especially production costs resulting from economies of scale, improving product quality, gaining trust and strengthening customers' loyalty to the products offered to them by ensuring the highest possible

[43] B. Drelich-Skulska, The evolution of international business in the era of globalization of the economy, "Economics Of The 21st Century" 2017; 4(16): 4-10.

[44] B. De Wit, R. Meyer, Synthesis of strategy, PWE, Warsaw 2007, p. 311.

(global) availability and improving competitive credibility. It also means enlarging potential sales markets, but also the necessity to compete with enterprises from almost all over the world. Therefore, enterprises are forced to develop and implement an appropriate strategy of international or global activity.

International entrepreneurship

International entrepreneurship is an issue that was first presented by JF Morrow in 1988[45]. Since then, many researchers have started working on this issue, trying to define it in an unambiguous way. WB Gartner described international entrepreneurship as a component of innovation and the creation of organizations analyzed in terms of the process[46]. Kirzner, in turn, drew attention to the use of opportunities that arise in the environment, which was agreed by other researchers on this issue[47]plus risk-taking, freedom and autonomy. Some researchers focused in particular on proactivity and innovation[48]. Miller, along with Lumpkin and Dess, pointed to the importance of aggressive competitiveness in shaping international entrepreneurship[49]. McDougall and Oviatt defined international entrepreneurship as a combination of innovation, proactivity and risk-seeking that cross national boundaries and are focused on creating value in organizations[50].

The same researchers presented a different definition of international entrepreneurship, additionally highlighting the possibility of building a new organization. Oviatt together with McDougall decided that international entrepreneurship should focus on finding, developing and exploiting the emerging opportunities in the form of future goods and services[51]. Taking into account all the advantages and disadvantages of the definition of international entrepreneurship presented by Oviatta and McDougall, it is accepted by a number of researchers, for example: Frederick, Thompson and Mellalieu, Coviello and Jones, Wiklund and Shepherd, Zhou, Huang and Wang, Tayauova or Jones, Coviello and Tang[52].

---

[45] J. F. Morrow, International entrepreneurship. A new growth opportunity, "New Management" 1998; 3.

[46] W. B. Gartner, "Who is an entrepreneur" is the wrong question, "American Small Business Journal" 1988; 12(4).

[47] H. H. Stevenson, J. C. Jarillo, A paradigm of entrepreneurship: Entrepreneurial management, "Strategic Management Journal" 1990; 11.

[48] L. F. Pitt, P. R. Berthon, M. H. Morris, Entrepreneurial pricing: The Cinderella of marketing strategy, "Management Decision" 1997; 35(5).

[49] Y. H. Li, J. W. Huang, M. T. Tsai, Entrepreneurial orientation and firm performance: The role of knowledge creation process, "Industrial Marketing Management" 2008; 38.

[50] P. P. McDougall, B. M. Oviatt, International entrepreneurship: The intersection of two research paths, "Academy of Management Journal" 2000; 43(5).

[51] B. M. Oviatt, P. P. McDougall, Defining International Entrepreneurship and Modeling the Speed of Internationalization, "Entrepreneurship Theory and Practice" 2005; 29(5).

[52] P. Nowacki, The impact of international entrepreneurship based on cooperation on shaping the competitiveness of an enterprise, doctoral dissertation, UAM, Poznań 2017, p. 22-26.

In the literature on the subject, an issue used interchangeably with international entrepreneurship is entrepreneurial orientation. When describing enterprises and discussing entrepreneurial orientation, researchers attribute to the company the same features as in the case of international entrepreneurship, i.e. innovation, proactivity and a tendency to take risks[53]. One can express the view that companies that intend to adopt an entrepreneurial orientation should start this process with the implementation of internal entrepreneurship. By creating conditions conducive to entrepreneurial initiatives within the company's structures, it becomes easier for the company to adopt international entrepreneurship with all its features.

The list of features attributed by various authors of international entrepreneurship and entrepreneurial orientation is presented in the table below.

Table 1. Classification of international entrepreneurship and entrepreneurial orientation according to the characteristics attributed to them by various researchers

Features of international entrepreneurship and entrepreneurial orientation	**Authors**
Innovation and proactivity	L. F. Pitt, P. R. Berthon, M. H. Morris, 1997; P. L. Yeoh, I. Jeong, 1995.
Innovation, risk taking and aggressiveness	S. F. Slater, J. C. Narver, 2000; A. Caruana, M. T. Ewing, B. Ramaseshan, 2002.
Innovation, proactivity and risk taking	D. Miller, P. H. Friesen, 1983; J. G. Covin, D. P. Slevin, 1986; P. P. McDougall, 1989; J. G. Covin, J. E. Prescott, D. P. Slevin, 1990; S. A. Zahra, 1991; J. L. Naman, D. P. Slevin, 1993; J. G. Covin et al., 1994; H. Barret, A. Weinstein, 1998; S. A. Zahra, D. O. Neubaum, 1998; K. Chadwick, S. Dwyer, T. Barnett, 1999; P. P. McDougall, B. M. Oviatt, 2000; S. A. Zahra, D. M. Garvis, 2000; C. Lee, K. Lee, J. M. Pennings, 2001; S.-Y. Yoo, 2001; B. H. Kemelgor, 2002; P. Kreiser, L. Marino, K. M. Weaver, 2002; L. Marino et al., 2002; F. W. Swierczek, T. T. Ha, 2003; J. Wiklund, D. Shepherd, 2003; N. E. Coviello, M. V. Jones, 2004; P. Dimitratos, P. Lioukas, S. Carter, 2004; H. H. Frederick, J. Thompson; P. J. Mellalieu, 2004; O. C. Richard et al., 2004; J. B. Arbaugh, L. W. Cox, S. M. Camp, 2005; S. N. Bhuian, B. Menguc, S. J .Bell, 2005; D. De Clercq, H. J. Sapienza, H. Crijns, 2005; B. M. Oviatt, P. P. McDougall, 2005a; A. Jantunen et al., 2005; J. Wiklund, D. Shepherd, 2005; J. G. Covin et al., 2006; J. M. L Poon, R. A. Ainuddin, S. Junit, 2006; A. Rauch et al., 2006; W. Stam, T. Elfring, 2006; L. Zhou, 2007; A. Rauch, M. Frese, 2009; V. K. Gupta, D. Dutta, 2010; S. K. Huang, Y. L. Wang, 2011;

[53] F. Kropp, N. J. Lindsay, A. Shoham, Entrepreneurial, market, and learning orientations and international entrepreneurial business venture performance in South African firms, "International Marketing Review" 2006; 23(5).

	G. Tayauova, 2011, M. V. Jones, N. E. Coviello, Y. K. Tang, 2011; B. A. George, L. Marino, 2011; A. Brunst, M. Brettel, 2014, H. Etemad, 2015.
Innovation, proactivity, risk taking and aggressiveness	K. Atuahene-Gima, A. Ko, 2001; G. T. Lumpkin, G. G. Dess, 2001.
Innovation, proactivity, risk taking and autonomy	D. F. Kuratko, R. M. Hodgetts, 2001; E. Monsen, 2005.
Innovation, proactivity, risk taking, aggressiveness and autonomy	G. George, D. R. Wood Jr., R. Khan, 2001; J. Frishammar, S. A. Horte, 2007; I. N. Baker, J. M. Sinkula, 2009; A. Gaweł, 2012a.
Proactivity, risk taking and future orientation	P. E. Stetz, 2000.
Proactivity, risk taking, autonomy and freedom	H. H. Stevenson, J. C. Jarillo, 1990.
Proactivity, risk taking, aggressiveness and future orientation, conservatism	N. Venkatraman, 1989.

Source: P. Nowacki, The impact of international entrepreneurship based on cooperation on shaping the competitiveness of an enterprise, doctoral dissertation, UAM, Poznań 2017, p. 25-26

When accepting the above-mentioned aspects of international entrepreneurship, they should be carefully characterized. Researchers wondered about the importance of innovation for international entrepreneurship. Finally, they confirmed the importance of innovation in the theory of international entrepreneurship and its positive impact on the company's results on foreign markets. Innovation is undoubtedly one of the most important factors in international entrepreneurship. The consequence of the high level of innovation is the greater propensity of the enterprise to adopt a proactive attitude and take risks. Therefore, enterprises showing a higher level of innovation than competing companies constitute a point of reference for them. You can also confirm that entrepreneurship and innovation are inseparable issues that together can constitute a source of enterprise competitiveness[54]. The second universal feature considered to be the premise of international entrepreneurship is proactivity, that is, the enterprise's search for various development opportunities in the near future, or the creation of opportunities on its own.

The conditions in which enterprises operate are highly competitive, making it difficult to achieve a sustainable competitive advantage. For this reason, one should rather talk about short-term advantages based on continuous innovation and the introduction of new products or services. A number of aspects, such as internationalization of activities, increased freedom of movement of goods and services and

[54] A. Gaweł, The influence of knowledge-based innovation on entrepreneurial outcomes, "International Journal of Transitions and Innovation Systems" 2012; 2(1).

standardization of activities carried out on foreign markets (with the simultaneous need to adapt some elements) have led to a situation in which enterprises, in order to stand out on the market, are looking for new, competitive solutions. Buyers require solutions that will meet their expectations. Because, contrary to the assumed theories about the standardization of buyers' needs, they are more and more individualized, firms need to consider the use of buyers' opinion when introducing new products or services to the market. Additionally, the development of modern devices with mobile Internet access is noticeable, changing the way of communication between entities on the B2B and B2C markets.

Globalization and the process of business internationalization

Globalization it is a feature of the modern stage of development of the world economy, which is less and less like a traditional economy, based on the sum of national economies. It is a completely new quality. Globalization of the world economy means not only a complex and multidimensional process, but also a very complex and variable structure, resulting in the emergence of a "unified" – spatially and economically - world market, integrating many, if not all, countries and regions. Globalization is a sequential process of various forms, which can be considered on specific scales, depending primarily on the territorial range. In the macro scale – it expresses the global perspective and dimension, but also refers to continents, countries and regions, on the meso scale – it applies to branches of the economy and industries, and on the micro scale – to enterprises[55]. The process of globalization in almost all areas of life - in economy, law, education, science, politics, culture, tourism and consumption patterns - has made national economies more interdependent than ever before. It leads to qualitatively new economic ties between individual continents, countries and their regional groupings, as well as markets and enterprises. Globalization is one of the most significant phenomena and processes of our time, creating new opportunities and threats. This is due to its very wide subject scope and multithreading, multidimensionality and complexity of economic, technical, social, cultural and political phenomena covered by this term[56].

The increasing role of foreign direct investments, the growth of international operations carried out, as well as the change in the perspective of management processes towards their internationalization (internationalization) resulted in the development of interest in international management. A company operating on international markets constantly verifies the effectiveness of management in confrontation with local and regional systems on distant markets that deviate from the systems prevailing on the domestic market. The internationalization of the enterprise has its

[55] J. Rymarczyk, Internationalization and globalization of enterprises, PWE, Warsaw 2004, p. 6-7.

[56] J. Walas-Trębacz, Globalization - premises and challenges for enterprises operating on international markets [in:] Management of an international enterprise. Integration of diversity, J. W. Wiktor (ed.), CH Beck Publishing House, Warsaw 2017, p. 11.

decision-making beginning based on the enterprise development strategy. There are a small number of enterprises in general that have been internationally located since their inception – the "born global" enterprises. Organizations involved in international business operate in many locations around the world, from which they obtain resources by selling products, and therefore in their activities they come into contact with many cultures. It should be emphasized that international business is mostly carried out by large corporations, as well as by small enterprises of the "born global" type. The vast majority of enterprises start their activities first on the local (or internal) market and, depending on the success of their activity and competitive position, aspire to internationalize their activities. Entrepreneurs, to a large extent, have to respond to the challenges posed by globalization processes. The more and more closely interconnected economies create an opportunity for the functioning of enterprises that make use of cultural conditions.

International business is expanding and the activities of "born global" companies are expanding. It should be noted that global processes are also the sources of emerging problems, and the lack of any reaction from managers to the prevailing opportunities and threats will certainly weaken the competitive potential of the organization on the international arena[57].

Globalization in its contemporary form and expression is a dynamic, multidimensional, complex and diverse process influenced by both economic forces, including financial, social, political, technical and cultural. The process of globalization affects the formation of the world economy and individual countries, the formation of a new social and moral order, and even the political order of the world. Globalization is such a qualitative change that transforms the current conditions of development to such an extent that it fundamentally changes the basic factors influencing the well-being of people, enterprises and countries. Due to the complex nature of the discussed process, there are many significant determinants and characteristics of global activity, especially economic, social and organizational. Globalization is defined as crossing all physical boundaries, such as space-time, national boundaries – administrative, economic boundaries – branches, industries, sectors or cultural boundaries. It means the occurrence of such social interactions on a global scale that events occurring in one part of our globe increasingly affect the state of its other spatially distant parts. This leads to quantitative and qualitative that events in one part of our globe increasingly affect the state of its other spatially distant parts. This leads to quantitative and qualitative that events in one part of our globe increasingly affect the state of its other spatially distant parts. This leads to quantitative and qualitative an increase in the interdependence of social and economic relations and the relationship between overlapping business and social activities on a global scale. Globalization is the result of transnational, transnational, supra-regional free market processes (supply, demand, technology transfer, trade, resource allocation, capital flows) reaching a global scale. It is an integrated multifaceted process of change that is created by phenomena and

[57] K. Szmulik, Cultural conditions of enterprise management of the "born global" type, "Acta Universita Nicolai Copernici" 2013; 413: 97-98.

social and economic activities on a global scale, as a result of which humanity transforms into a single global society, and the world economy becomes very interconnected and internally interdependent[58,59]. The term globalization also encompasses a new process of strategic thinking and management in line with the characteristics and nature of the information society as well as entrepreneurial and innovative cross-border business. The process is based on a global perspective focusing on:

- development of an intelligent knowledge economy oriented to the possible full fulfilment of the needs and requirements (satisfaction) of both global and local customers,
- shaping research, development and transfer of knowledge and technologies, especially advanced ones, and at the increasing level of education,
- information civilization based on knowledge and its diffusion,
- shaping the global economic order and activities of transnational corporations,
- standardization of resource-efficient and labour-saving products and services,
- internationalization of enterprises and connections between them and the increase in international trade turnover, including the improvement of global logistics processes,
- globalization and liberalization of markets and financial flows and their instability (reduced risk sensitivity),
- a free global market with a high level of competitive forces and increasingly fierce competition,
- internal integration of the world economy, alliances of organizational networks, interdependence of the needs of cooperation and coordination,
- locating foreign investments and striving to maximize added value and minimize costs,
- the growing importance of the requirements of sustainable development in the world, including environmental protection problems (saving resources, energy, preventing pollution, recycling resources, etc.)[60,61].

Global business means the scope of all activities and their ability to participate in the global market. It covers all commercial, cross-border enterprise activities including the flow of resources (raw materials, capital, people, technology), goods (semi-finished and finished goods), services (financial, commercial, communication, information and education) and skills (managerial and technical) . Global business operates with almost full freedom of movement of goods, services and capital, with full openness to external competition of increasing not only scope but also quality level. It contributes to substantially raising the bar of competition in the global market. Under the conditions of globalization, the nature and quality of all competitive

[58] K. Kuciejewski, On the essence and consequences of globalization. New world order or supranational chaos [in:] European Studies, University of International Economic and Political Relations, Gdynia 2003.

[59] W. Szymański, Globalization, challenges and threats, Diffin Publishing House, Warsaw 2001.

[60] C. L. Pearce, J. A. Maciariello, H. Yamawaki, Drucker's… op. cit.

[61] G. Stonehouse, J. Hamill, D. Campbell, T. Purdie, Globalization… op. cit.

forces are also changing. The position of domestic recipients and suppliers is declining, because in the conditions of market liberalization and market internationalization, a domestic recipient may be replaced by a foreign (external) recipient, and a domestic supplier by a foreign (external) supplier. The number of substitutes for goods and services is also growing, and hence the strength of the global customer[62,63]. More and more companies and their products (services) function as a result of complex international flexible for the needs of global markets and local systems aimed at a common goal, mobilization of forces and resources and building a competitive advantage on a global scale. The aforementioned companies are also very active in creating a dynamic competitive environment based on knowledge and innovation. In global business, a key role is played by large internationally consolidated multinational corporations, most often with a network organizational structure, operated in a global competitive environment. Their activities are based on a multidimensional perspective, which includes global and local markets, customer tastes and preferences, resources, including capital and human resources, costs, partners and competitors, and benefits. Detailed connections of strategic elements of global business are presented in Figure 1. Corporations strengthen their position of global megaphim thanks to the concentration and internationalization of capital, the process of mergers or acquisitions of companies and strengthening organizational networks. In addition, they can strengthen their position thanks to the internal value chain (increasing the efficiency of supply and distribution cells) and fuller use of processing capacity, increasing sales and profits. They gain the benefits of having global products and services by standardizing the base product or parts thereof, while adapting to the individual needs of consumers.

A feature of contemporary business conditions in the global conditions and in the operation of multinational enterprises, there is a constant geographic, economic and social expansion of their activities. This is an inspiration to create new strategic forms of operation of enterprises in a global environment and to build new models of business organizations that facilitate rapid cooperation, coordination and establishing relationships across organizational boundaries. The expression of these processes is the formation of various networks of organizations with high interdependence and internal solid but at the same time open and flexible connections. It is about creating the potential to maximize value for the buyer by building a network of capabilities, skills and resources. The functioning of such networks makes it possible to combine within the framework of joint initiatives and innovative activity, using various unique skills as well as creating specialized configurations and competences distributed in many network organizations. The network creates more potential opportunities for the development of innovative activities and innovative activities

[62] W. Szymański, Globalization, challenges… op. cit.

[63] A. Tubielewicz, The concept of creating a network organization [in:] Innovations in management and production engineering, R. Knosala (ed.), Publishing House of the Polish Production Management Society, Opole 2013.

linking the economic and logistics spheres[64]. By building a balance between diversity and interdependence, network organizations create a qualitatively global environment, consisting of a large number of related tasks and paths of action with the participation of many participants pursuing a strictly defined goal. The foundations for the construction and development of a business network organization, especially a multinational enterprise, is knowledge-based management and the development of information and telecommunications technologies ensuring effective cooperation and management of complex spatial and organizational structures. Effective use of knowledge management as the most unique resource that provides the greatest chance of creating a sustainable competitive advantage by economic entities participating in international organizational networks.

It should be emphasized that an organization based on knowledge should[65,66]:

- be process-oriented, be able to learn in particular from their stakeholders,
- have an organizational culture supporting knowledge management, and
- effectively implement learning outcomes, and thus efficiently manage knowledge.

Conclusions

Effective use by economic entities operating within international organizational networks also increases their competitiveness in gaining product leadership, operational excellence related to the performance of basic operations such as: procurement, production, sales, distribution and service[67]. Thanks to the transfer of knowledge, unique competences and corporate skills are also co-created. The size of network benefits also depends on their configuration of the geographical scope of activities and the shape that the network adopts during the implementation of common goals and tasks, as well as on linking and integrating mechanisms. Among the factors shaping the network created by transnational enterprises one can mention scattered, internally and externally interdependent structures globally integrated with effective cooperation procedures. The essence in this respect are activities in the form of outsourcing or offshoring, the wide establishment of various forms of cooperation between companies, such as partnership agreements such as joint venture and strategic alliances. The activity of business in the field of mergers and acquisitions and other various forms of cooperation with suppliers, carriers, customers, competitors, financial organizations is in the global economy mechanisms contributing to building integrated international organizational, production, distribution and communication networks of cooperation with internal and external partners. A feature of

[64] A. Tubielewicz, The concept… op. cit.

[65] P. Banasik, Community of practitioners in the organization of the judiciary: a modern model of professional development for the management of the judiciary, "E-mentor" 2014; 5(57).

[66] J. Brudlak, Knowledge management and the product innovation process, SGH, Warsaw 2005.

[67] P. Sadza, The influence of information technologies on the competitive strategies of enterprises [in:] Trans`01- Wspólna Europa, enterprise in the face of globalization, PWN, Warsaw 2001.

these networks is their high density of various connections and the complexity of emerging configurations linking local, national and international coordinated activities of multinationals. These activities include, in particular, the production and movement of materials and products within defined global networks. Cooperation within the network by breaking functional barriers is oriented towards a common goal, processes[68]. Networks created by a transnational enterprise are usually dominated networks. Such a network is composed of nodes (companies in the network) and connections between them. The method of establishing connections between the various elements of the corporate organizational network is also important. A strong glue of the internal interaction of this network is a global cultural metaphor. It shows a way of organizing with the use of common norms, values and ideas, i.e. common visions and directions for future development[69].

As part of the network, a transnational corporation can develop its business activities around the world or it can disperse some activities and accumulate others in places that offer specific benefits and allow access to resources and customers in different countries. Manufacturing products for more than one market requires access to a variety of international distribution channels. The pressures of the global market and competition place special demands on the corporate network organization in terms of lowering costs, greater quality, greater flexibility, fast delivery and agile distribution, and the immediate introduction of products to the market.

Global cross-functional management focuses, inter alia, on issues such as:

- maintaining the importance and role of organizations across cultural and national boundaries and striving to create an optimal level of total value,
- management of complex and interrelated internal and external relations,
- dependence on the transfer and spread of advanced technologies,-the ability to skilfully introduce products in line with the demand on the global and local (key) market,
- choosing a strategy for operating on the international market for a global corporate network,
- creating a dynamic innovative environment for business, inter alia, by strengthening international cooperation in areas such as research, transfer of knowledge and advanced technologies, education, innovative services, etc.,
- integrating and coordinating geographically dispersed activities (linking and merging, ordering and harmonizing cooperation), many activities carried out in various organizational units distributed on a global scale, including coordination of the value chain of international enterprises,
- developing global personal professional competences regarding key relationships in the field of production, logistics, marketing and organizational cultures,
- developing mutually beneficial relationships with customers, suppliers, employees and societies, building an effective organizational system and communication channels at the level of individual organizational units and the entire network,

[68] K. Lysons, Supply purchases, PWE, Warsaw 2004.

[69] G. Morgan, Images of an organization, PWN, Warsaw 2005.

- the ability to identify the most important inter-functional and inter-organizational relationships,
- determining the optimal degree of centralization and decentralization of strategic and operational decisions (on a global and local level) and mechanisms for their effective implementation within network connections,
- creating international teams, the ability to adapt to cultural changes,
- international control of material flows, both flowing within the network and coming from outside,
- the ability to recognize risk on a macro and micro scale (riskogenic situations) and the consequences for international business,
- awareness that corporations should be more accountable to society for their actions.

Bibliography

Al-Aali A., Teece D. J., International Entrepreneurship and the Theory of the (Long--Lived) International Firm: A Capabilities Perspective, „Entrepreneurship Theory and Practice" 2010; 38(1): 95-116.

Allen I., International Entrepreneurship Theory: Past, Present and Way Forward, „Entrepreneurial Business and Economics Review" 2016; 4(4): 93.

Andersson S., International Entrepreneurship, Born Globals and the Theory of Effectuation, "Journal of Small Business and Enterprise Development" 2001; 18(3): 627-643.

Angelsberger M., Kraus S., Mas-Tur M., Roig-Tierno N., International Opportunity Recognition: An Overview, „Journal of Small Business Strategy" 2017; 27(1): 19.

Ball D., McCulloch W. H., International Business – Introduction and Essentials, Addison-Wesley Publishing Company, New York 1991.

Banasik P., Community of practitioners in the organization of the judiciary: a modern model of professional development for the management of the judiciary, "E-mentor" 2014; 5(57).

Begg D., Fischwer S., Dornbusch R., Ekonomia, PWE, Warsaw 1992.

Brudlak J., Knowledge management and the product innovation process, SGH, Warsaw 2005.

Czubik P., Free trade in goods. International law foundations of commercial regionalism, Kantor Wydawniczy Zakamycze, Kraków 2002.

Daszkiewicz N., Determinants of the pace of internationalization of enterprises with particular emphasis on born globals, „Studia Ekonomiczne" 2016; 271: 7-16.

Daszkiewicz N., Internationalization of Firms through Networks-Empirical Evidence from Poland, „International Entrepreneurship and Corporate Growth in Visegrad Countries" 2001; 57: 70-81.

Dębiński P. H., Economic and Financial Globalization. What the Numbers Say, Observatoire de la Finance, Geneva 2003.

De Wit B., Meyer R., Synthesis of strategy, PWE, Warsaw 2007.

Drelich-Skulska B., The evolution of international business in the era of globalization of the economy, "Economics Of The 21st Century" 2017; 4(16): 4-10.

Duda S., Kuśpit J., Mamcarz H., Pakauła A., Żukowska H., Żukowski M., Outline of Economics, UMCS, Lublin 2003.

Duliniec E., Early internationalized enterprises – conditions and development, „Gospodarka Narodowa" 2011; 5-6: 1-20.

Duliniec E., Theoretical views of early and rapid internationalization of enterprises, „Gospodarka Narodowa" 2013; 21(1-2): 31-52.

Gabrielsson M., Sasi V., Darling J., Finance Strategies of Rapidly-Growing Finnish Smes: Born Internationals and Born Globals, „European Business Review" 2024; 16(6): 590-604.

Gartner W. B., "Who is an entrepreneur" is the wrong question, "American Small Business Journal" 1988; 12(4).

Gaweł A., The influence of knowledge-based innovation on entrepreneurial outcomes, "International Journal of Transitions and Innovation Systems" 2012; 2(1).

Gołębiowski G., Entrepreneurship in Poland in the light of the Global Entrepreneurship Monitor research, „Studia BAS" 2014; 1: 9-25.

Gorynia M., On the classification of sciences dealing with international economic activity, [in:] Globalization and regionalization in the world economy. Jubilee book of Professor Jan Rymarczyk, Skulska B., Domiter M. (ed.), Warsaw 2012.

Griffin R. W., Pustay M. W., International Business. A Managerial Perspective, Pearson Prentice Hall, New Jersey 2007.

Gwiazda A., Globalization and regionalization of the world economy, Adam Marszałek Publishing House, Toruń 2000.

Hofman-Kohlmeyer M., International Entrepreneurship in the Light of Scientific Research - Literature Review, "Economic Studies. Scientific Papers of the University of Economics in Katowice" 2018; 352.

Jean C., Geopolitics, Zakład im. Ossolińskich, Wrocław 2003.

Jones M.V., Coviello N., Tang Y. K., International Entrepreneurship Research (1989–2009): A Domain Ontology and Thematic Analysis, „Journal of Business Venturing" 2014; 26(6): 632-659.

Kaczmarek T., Królak-Wewińska J., International Trade: Risk Management. Financial settlements, Wolters Kluwer, Warsaw 2008.

Kamerschen D. R., McKenzie R. B., Nardinelli C. N., Ekonomia, Economic Foundation of NSZZ "Solidarność", Gdańsk 1991.

Koźmiński A. K., International Management, Polish Economic Publishing House, Warsaw 1999.

Kropp F., Lindsay N. J., Shoham A., Entrepreneurial, market, and learning orientations and international entrepreneurial business venture performance in South African firms, "International Marketing Review" 2006; 23(5).

Kuciejewski K., On the essence and consequences of globalization. New world order or supranational chaos [in:] European Studies, University of International Economic and Political Relations, Gdynia 2003.

Li Y. H., Huang J. W., Tsai M. T., Entrepreneurial orientation and firm performance: The role of knowledge creation process, "Industrial Marketing Management" 2008; 38.

Lysons K., Supply purchases, PWE, Warsaw 2004.

Malendowski W., Mojsiewicz C., International Relations, Atla 2 Publishing House, Wrocław 1998.

McConnell R., Economics, McGraw-Hill Book Company, New York 2000.

McDougall P. P., Oviatt B. M., International entrepreneurship: The intersection of two research paths, "Academy of Management Journal" 2000; 43(5).

Morgan G., Images of an organization, PWN, Warsaw 2005.

Morrow J. F., International entrepreneurship. A new growth opportunity, "New Management" 1998; 3.

Nowacki P., The impact of international entrepreneurship based on cooperation on shaping the competitiveness of an enterprise, doctoral dissertation, UAM, Poznań 2017.

Nowakowski M., International Business. From internationalization to globalization, SGH, Warsaw 2015.

Oviatt B. M., McDougall P. P., Defining International Entrepreneurship and Modeling the Speed of Internationalization, "Entrepreneurship Theory and Practice" 2005; 29(5).

Pearce C. L., Maciariello J. A., Yamawaki H., Drucker Heritage, Wolters Kluwer Publishing House, Warsaw 2013.

Pitt L. F., Berthon P. R., Morris M. H., Entrepreneurial pricing: The Cinderella of marketing strategy, "Management Decision" 1997; 35(5).

Ratajczak-Mrozek M., Network approach to internationalization of enterprises, „Marketing i Rynek" 2009; 3: 7-11.

Rymarczyk J., International Business, PWE, Warsaw 2012.

Rymarczyk J., Internationalization and globalization of enterprises, PWE, Warsaw 2004.

Rymarczyk J., Wróblewski M., Non-European integration groups, Oficyna Wydawnicza Arboretum, Wrocław 2006.

Rynarzewski M., Zielińska-Głebocka A., International economic relations, Theory of exchange and foreign trade policy, PWN, Warsaw 2006.

Sadza P., The influence of information technologies on the competitive strategies of enterprises [in:] Trans`01 – Wspólna Europa, enterprise in the face of globalization, PWN, Warsaw 2001.

Salamzadeh A., Kirby D. A., New Venture Creation: How Start-ups Grow?, „AD-minister" 2017; 30: 9-29.

Samuelson P. A., Nordhaus W. D., Economics, McGraw-Hill Book Company, New York 2000.

Shenkar O., Luo Y., International Business, John Wiley & Sons, INC, New Jersey 2002.

Sołdaczuk J., History of international trade. Zarys, Private University of Economics, Warsaw 1995.

Stevenson H. H., Jarillo J. C., A paradigm of entrepreneurship: Entrepreneurial management, "Strategic Management Journal" 1990; 11.

Stonehouse G., Hamill J., Campbell D., Purdie T., Globalization. Strategy and Management, Felberg SJA Publishing House, Warsaw 2001.

Szmulik K., Cultural conditions of enterprise management of the "born global" type, "Acta Universita Nicolai Copernici" 2013; 413: 97-98.

Szymański W., Globalization, challenges and threats, Diffin Publishing House, Warsaw 2001.

Tubielewicz A., The concept of creating a network organization [in:] Innovations in management and production engineering, Knosala R. (ed.), Publishing House of the Polish Production Management Society, Opole 2013.

Wach K., Familiness and Born Globals: Rapid Internationalization among Polish Family Firms, „Journal of Intercultural Management" 2014; 6(3): 177-186.

Walas-Trębacz J., Globalization – premises and challenges for enterprises operating on international markets [in:] Management of an international enterprise. Integration of diversity, Wiktor J. W. (ed.), CH Beck Publishing House, Warsaw 2017.

World Investment Report, 2001-2018, UNCTAD, United Nations, New York and Geneva.

Zahra S. A., A Theory of International New Ventures: A Decade of Research, „Journal of International Business Studies" 2005; 36(1): 20-28.

https://www.rp.pl/Plus-Minus/303029949-Koncerny-silne-jak-panstwa-Kto-rzadzi--swiatem.html.

*Hanna Kostovyat**
*Viacheslav Rogov***

THE THEORETICAL FOUNDATIONS OF ENTERPRISE'S DIGITAL TRANSFORMATION

Teoretyczne podstawy cyfrowej transformacji przedsiębiorstw

*PhD., Uzhhorod National University in Ukraine, ORCID: 0000-0001-8498-3419
**PhD., Admiral Makarov National University of Shipbuilding in Ukraine, ORCID: 0000-0002-1847-5907

Streszczenie

Artykuł dostarcza dogłębnej analizy teoretycznych podstaw cyfrowej transformacji we współczesnym środowisku biznesowym. Badanie analizuje czynniki wpływające na pomyślne wdrożenie technologii cyfrowych w organizacjach. Opracowanie uwzględnia również implikacje tych modeli teoretycznych dla strategii cyfrowej transformacji, dostarczając zniuansowanego zrozumienia, jak przedsiębiorstwa mogą wykorzystać te spostrzeżenia w celu zwiększenia innowacyjności, konkurencyjności oraz długoterminowej zrównoważoności. Zasady wdrażania cyfrowej transformacji są analizowane. Badanie podkreśla konieczność dostosowania się firm do szybkich zmian technologicznych, które tworzą zarówno nowe możliwości, jak i wyzwania. Udowodniono znaczenie przyjęcia zwinnych podejść zarządzania w celu radzenia sobie z niepewnością. Opracowanie dowodzi, że cyfrowa transformacja to nie tylko technologiczne ulepszenie, lecz także strategiczna zmiana, która wymaga zmiany sposobu myślenia, podejść oraz kultury korporacyjnej.

Słowa kluczowe: *cyfrowa transformacja, teorie, strategie, zasady, adaptacja, zmiany*

Summary

The paper provides an in-depth exploration of the theoretical foundations that underpin digital transformation in the contemporary business environment. The research investigates the factors influencing the successful adoption of digital technologies within organizations. The study also considers the implications of these theoretical models on digital transformation strategies, providing a nuanced understanding of how businesses can leverage these insights to enhance innovation, competitiveness, and long-term sustainability. The digital transformation implementation principles are analyzed. The research highlights the necessity for businesses

to adapt to the rapid technological changes, which create new opportunities as well as challenges. The importance of adopting agile management approaches to navigate uncertainty is proven. The study argues that digital transformation is not merely a technological upgrade but a strategic shift that requires changes in thinking, approaches, and corporate culture.

Key words: digital transformation, theories, strategies, principles, adaption, changes

In today's rapidly evolving world, where technological progress unexpectedly reshapes the business landscape, enterprises are facing complex challenges and the need to adapt to an ever-changing market environment. The application of innovative technologies has become crucial for ensuring competitiveness and survival on the market.

Currently, technologies such as the Internet of Things (IoT), data analytics, artificial intelligence (AI), blockchain, and cloud services are transforming all areas of business: from manufacturing and services to marketing and customer interactions. These technologies are revolutionizing how enterprises operate, interact with their customers, optimize their processes, and implement innovative solutions.

An important aspect of digital transformation is the adaptation to changes in the market environment. Technological shifts can unpredictably alter business conditions, creating new opportunities while, simultaneously, presenting new challenges and threats. Therefore, enterprises must be prepared to rapidly respond to said changes, identify new possibilities, and implement innovative solutions.

One way to adapt to these changes is by adopting an agile approach to management. Agile methodology emphasizes flexibility, the ability to react quickly to changes, experimentation, and innovation. Applying agile methodologies enables enterprises to adapt to uncertainty and ambiguity, adjust their strategies and plans according to the new conditions.

Another significant aspect of digital transformation is the utilization of data analytics and AI. Through the analysis of large datasets, enterprises can gain valuable insights and discover new opportunities to enhance their processes and services. AI assists in solving complex tasks, forecasting market trends, and responding to real-time changes.

However, along with the opportunities presented by digital transformation, new challenges must also be considered. Enterprises need to ensure cybersecurity and data protection against potential threats and cyberattacks. This becomes particularly crucial as the instances of cybercrimes and data breaches continue to rise, potentially leading to severe consequences for businesses.

Another aspect of digital transformation is the development of the new competencies and skills within the workforce. Thoroughly preparing the workforce for digital transformation and equipping them with skills and knowledge about new technologies can unlock the employees' potential and enhance work productivity.

Such an approach contributes to forming a team that is adept at utilizing digital tools to achieve the enterprise's strategic goals.

Hence, digital transformation holds the promise of opening broad horizons for the enterprises. Nevertheless, the successful implementation of this process demands careful preparation and a strategic approach[1]. Organizations must be prepared for active changes and flexible adaptation, integrating innovative technologies, and employing novel management methods. Enterprise leadership should recognize that digital transformation is not merely a technological upgrade but a strategic reboot, necessitating a shift in thinking, approaches, and corporate culture. To be successful in this process, it is essential to create an environment that is conducive to change and encourages a creative approach to problem solving.

It is noteworthy that digital transformation creates numerous new opportunities for the enterprises, such as process automation, personalized customer service, innovative product development, and expanding global influence. However, in order to excel in this realm, organizations must be ready to embrace innovative approaches and effectively manage changes and risks.

Thus, the incorporation of innovative technologies into strategic management allows the enterprises to establish competitive advantages, accelerate the development and implementation of new products and optimize internal processes. However, success hinges on the management's ability to adapt to changes, understand risks, and effectively harness digital possibilities to achieve the strategic objectives.

Digital transformation of enterprises is the process of integrating innovative digital technologies, tools, and approaches into the operations of businesses with the aim of optimizing business processes, enhancing customer interactions, creating new products and services, and ensuring competitiveness and market resilience. It encompasses the adoption of cutting-edge technologies such as AI, data analytics, cloud services, IoT, blockchain, augmented reality (AR), and many others. These technologies enable enterprises to collect, analyze, and utilize vast amounts of data, automate the processes, and, thereby, enhance productivity, product, and service quality, and enable more efficient management.

The implementation of digital transformation is based on a set of principles that define the strategic approach and directions of the company activities for successful utilization of innovative technologies and changes in the context of the modern business environment.

One of the key principles of digital transformation is the understanding of the customer needs and demands. Digital technologies can help companies improve the service quality, provide personalized experiences, and enhance interactions with customers. Understanding and analyzing customer needs enables organizations to create innovative products and services that meet their expectations and requirements.

Another important aspect is fostering an innovative culture within the organization. Digital transformation involves implementing new ideas and taking risks. To

[1] G.C. Kane, D. Palmer, A.N. Phillips, D. Kiron, N. Buckley, Strategy, not technology, drives digital transformation, MIT Sloan Management Review, 2015.

achieve this, it is essential to create an environment where employees are motivated and open to experimentation and innovation. Developing an innovative culture helps companies attract talented professionals, generate new ideas, and accelerate the adoption of new technologies.

Additionally, one of the fundamental principles is to invest in the learning and development of its employees. The adoption of digital technologies requires the employees to acquire new knowledge and skills. Organizations should ensure adequate training and support to enable employees to use new technologies and tools effectively.

Ensuring cybersecurity and data protection is also a crucial principle. The implementation of digital technologies involves increased digital data volume, which can introduce new risks and threats to security. Companies need to respond appropriately to safeguarding their data and ensuring cybersecurity.

There are certain theories that shape the foundation for a comprehensive understanding of a digital transformation of an enterprise, guiding organizations toward successful integration and optimization of digital technologies.

Theories such as the Technology Acceptance Model (TAM) and the Innovation Diffusion Theory help to explain how organizations adopt and assimilate new technologies. Understanding the factors that influence the technology adoption, such as perceived usefulness, ease of use and social influence, assists in planning and managing digital transformation initiatives.

The Technology Acceptance Model (TAM) was first introduced by Fred Davis and has since become a cornerstone in understanding the factors that influence intentions to use technologies. TAM identifies two main factors that determine the acceptance of technologies: perceived usefulness and perceived ease of use. Users assess whether a particular technology will enhance their job performance or make tasks easier and evaluate the ease of learning and applying this technology. TAM also emphasizes that external variables, such as training and support, can influence users' perceptions and, consequently, their acceptance of technology. The model has been widely used to predict and explain users' intentions to adopt various technological innovations, including digital tools and systems.

In the context of enterprise digital transformation, TAM can provide valuable insights into how employees perceive and respond to new digital technologies. By addressing perceived usefulness and ease of use, organizations can design better strategies for introducing and implementing digital solutions, ultimately contributing to the success of their transformation efforts.

Innovation Diffusion Theory, developed by Everett Rogers, provides a comprehensive framework for understanding how new ideas and technologies spread through cultures. This theory is particularly relevant in the context of digital transformation, a process that fundamentally changes how organizations operate and deliver value to customers through the integration of digital technologies. In the digital age, the diffusion of innovations takes on new dimensions as organizations grapple with rapidly evolving technologies, increased connectivity, and the need for continuous adaptation.

Innovation Diffusion Theory suggests that the adoption of digital technologies follows a predictable pattern characterized by five stages: knowledge, persuasion, decision, implementation, and confirmation. Initially, organizations must become aware of the new digital tools and understand their potential benefits (knowledge). This awareness often comes from exposure to information through various communication channels, including industry reports, conferences, and digital media. The persuasion stage involves forming a favorable attitude towards the innovation, which is influenced by the perceived attributes of the technology, such as its relative advantage, compatibility, complexity, trialability and observability. The decision stage involves the organization's commitment to adopt the innovation, followed by the implementation stage where the technology is integrated into everyday operations. Successful implementation often requires changes in organizational processes, learning and development (L&D) for employees and restructuring to support the new ways of working. Finally, in the confirmation stage, the organization seeks reassurance that the decision to adopt the digital innovation was beneficial, leading to sustained use and further integration.

The categories of adopters identified by Innovation Diffusion Theory, i.e. innovators, early adopters, early majority, late majority, and laggards, are evident in digital transformation efforts. Innovators within an organization are typically the tech enthusiasts and forward-thinking leaders who advocate for adopting new digital tools. Early adopters, who are influential and respected within their networks, can help champion the change and demonstrate the benefits to others. The early majority follows, building momentum as more employees and departments begin to adopt the technologies. The late majority and laggards may require additional support and encouragement, as they might be more resistant to change or skeptical about the benefits.

The social system within an organization, including its norms, values, and structures also affects the diffusion of digital innovations. Organizations with a culture that embraces change, continuous learning, and innovation are more likely to successfully navigate the digital transformation[2]. Leadership plays a critical role in setting the tone, providing vision, and ensuring that adequate resources and support are available for the transition.

Thus, by applying the principles of Innovation Diffusion Theory, organizations can not only facilitate smoother transitions but also achieve a more profound and sustained competitive advantage.

Resource-Based View (RBV) theory, developed by Jay Barney in 1991, emphasizes that unique resources and capabilities of a company contribute to its competitive advantage. Organizations leverage digital technologies as strategic resources to create distinctive capabilities, innovate and achieve sustainable competitive advantages.

The RBV focuses on identifying, developing, and utilizing internal resources and capabilities that are valuable, rare, inimitable and non-substitutable (VRIN). In the

[2] I. M. Sebastian, J. W. Ross, C. Beath et all, How big old companies navigate digital transformation. Strategic information management, Routledge 2020, p. 133-150.

context of digital transformation, RBV provides a robust framework for understanding how digital technologies can be harnessed as strategic resources to create distinctive capabilities, drive innovation, and secure sustainable competitive advantages.

Digital technologies such as cloud computing, AI, big data analytics and the IoT have become critical assets for the modern organizations. These technologies enable businesses to optimize operations, enhance customer experiences, and develop new business models. From an RBV perspective, the integration of digital technologies transforms them into valuable resources that enhance a company's strategic capabilities. For instance, data analytics capabilities allow organizations to derive actionable insights from vast amounts of data, leading to improved decision-making and more effective strategies. AI and machine learning can automate complex processes, increase operational efficiency, and provide personalized customer experiences, thus differentiating the organization in the market.

The rarity of digital capabilities is another important aspect emphasized by RBV. While many organizations have access to digital technologies, the ability to effectively integrate and leverage these technologies in unique ways is what creates a competitive edge. Companies that develop proprietary algorithms, specialized software, or unique data sets can create rare resources that are difficult for competitors to replicate. The talent and expertise within the organization further enhance this rarity. Skilled personnel who can develop, implement, and optimize digital technologies are essential to building and sustaining these rare capabilities.

Inimitability, another essential component of RBV, refers to the difficulty the competitors face in replicating a firm's resources and capabilities. Digital technologies, when combined with a company's unique processes, culture, and knowledge, become highly inimitable. For example, the way an organization integrates customer feedback into product development through digital platforms can create a distinctive process that competitors find hard to replicate. Furthermore, the tacit knowledge embedded within a company's workforce regarding the use and optimization of the digital tools adds another layer of inimitability. Organizational culture that fosters innovation and agility is also a significant factor in making digital capabilities difficult to imitate.

Non-substitutability is the final attribute in the VRIN framework, highlighting that there should be no equivalent substitutes for the resources and capabilities an organization possesses. In the digital realm, this means that the specific combination of digital technologies, data, expertise, and processes within an organization cannot be easily replaced by other means. For instance, a company's integrated digital marketing strategy that leverages big data analytics, AI-driven customer insights, and personalized content delivery may be irreplaceable by competitors relying on traditional marketing approaches.

RBV also emphasizes the importance of continuous improvement and dynamic capability development. In the fast-paced digital landscape, organizations must continually evolve their digital capabilities to maintain their competitive advantage[3].

[3] D. J. Teece, Business models and dynamic capabilities, "Long range planning" 2018; 51(1): 40-49.

This involves investing in the ongoing L&D for employees, staying abreast of the technological advancements, and fostering a culture of innovation. By doing so, the organizations can ensure that their digital resources remain valuable, rare, inimitable, and non-substitutable over time.

In practical terms, leveraging RBV in the context of digital transformation requires a strategic approach to resource management. Organizations need to conduct regular assessments of their digital assets and capabilities, identify gaps, and invest in building or acquiring the necessary resources. Collaboration and partnerships with technology providers, academic institutions, and other businesses can also enhance an organization's digital capabilities. Moreover, aligning digital strategy with overall business objectives ensures that digital resources are effectively utilized to drive competitive advantage.

Thus, Resource-Based View provides a comprehensive framework for understanding how digital technologies can be transformed into strategic resources that contribute to a company's competitive advantage. By focusing on the VRIN attributes organizations can develop and sustain distinctive digital capabilities that drive innovation, improve performance, and secure long-term success in the digital age. This strategic approach enables businesses to not only maintain pace with technological advancements but also to leverage them in ways that create significant and sustainable competitive advantages.

Digital Ecosystem Theory examines how organizations collaborate, compete, and interact within a digital ecosystem composed of various stakeholders, including customers, partners, and competitors. The theory highlights the interconnectedness and interdependence of modern business environments, where value creation and competitive advantage emerge from the collective efforts of various entities rather than isolated actions. By understanding the dynamics of the digital ecosystem, organizations can craft more effective digital strategies and enhance their engagement with the ecosystem which leads to improved innovation, resilience, and market positioning.

A digital ecosystem encompasses a wide range of participants, including businesses, consumers, technology providers, regulatory bodies, etc. Each participant fulfills a unique role and contributes to the overall functionality and the evolution of the ecosystem. Organizations operate within this ecosystem by leveraging digital technologies to connect with other stakeholders, share resources, and co-create value. The interdependent nature of these relationships means that the actions of one participant can significantly impact the entire ecosystem.

Collaboration within a digital ecosystem is an essential aspect of Digital Ecosystem Theory. Organizations collaborate with partners to access the complementary resources, capabilities, and technologies that they may not possess internally. For example, a company may collaborate with a technology firm to integrate advanced analytics into its operations, or with a logistics provider to enhance its supply chain efficiency. Such collaborations enable organizations to innovate more rapidly and respond more effectively to the market demands. The shared knowledge and resources within the ecosystem also foster a culture of continuous improvement and mutual growth.

Competition within a digital ecosystem is equally important. Organizations compete not only for the market share but also for the attention and engagement of other stakeholders. However, this competition is often characterized by coopetition, where companies both collaborate and compete simultaneously. For instance, businesses might collaborate on developing industry standards or investing in research and development jointly while competing within the marketplace. This dynamic creates a balance that drives innovation and pushes all participants to improve their offerings and operations continually.

Customer engagement is a pivotal element in the dynamics of a digital ecosystem. Customers are not just passive recipients of products and services but rather they are the active participants who influence the ecosystem through their preferences, feedback, and behavior. Digital technologies enable organizations to engage with customers in a more interactive and personalized manner. Social media, online communities, and digital platforms facilitate real-time communication and feedback loops, allowing organizations to adapt their strategies and offerings based on customer insights. By understanding customer needs and preferences, organizations can create more targeted and relevant value offers, enhancing customer satisfaction and loyalty.

The role of technology providers and platforms within a digital ecosystem cannot be overstated. These entities provide the infrastructure, tools, and services that enable connectivity and collaboration among participants. Cloud computing, big data, AI and blockchain are examples of technologies that support the functioning of the digital ecosystems. Platforms such as Amazon Web Services, Google Cloud, and Microsoft Azure provide scalable and flexible solutions that organizations can leverage to build and expand their digital capabilities. Additionally, the digital platforms like e-commerce marketplaces, social media networks, and collaborative software solutions facilitate interactions and transactions among ecosystem participants.

Regulatory bodies and societal actors also influence the dynamics of a digital ecosystem. Regulations related to data privacy, cybersecurity, and digital trade shape how organizations operate and interact within the ecosystem. Compliance with these regulations is crucial for maintaining trust and credibility. Furthermore, societal, and environmental considerations, such as sustainability initiatives and ethical practices, are increasingly becoming integral to digital strategies. Organizations that proactively address these issues can enhance their reputation and build stronger relationships with stakeholders.

An understanding of the dynamics of a digital ecosystem provides insight into the development of effective digital strategies and the manner in which organizations engage with their respective ecosystems. A strategic approach involves identifying key stakeholders, mapping out the ecosystem, and analyzing the interdependencies and value exchanges among participants. Organizations need to recognize the shifting roles and influences within the ecosystem and adapt their strategies accordingly. For instance, as new technologies emerge and customer expectations evolve, organizations must continuously innovate and update their digital capabilities.

Effective ecosystem engagement requires organizations to foster open communication, build trust, and create value for all participants. This involves not only leveraging digital technologies but also cultivating a culture of collaboration and agility. Organizations should seek to create win-win scenarios where all participants benefit from the interactions. This can be achieved through transparent practices, shared goals, and equitable distribution of value.

Thus, Digital Ecosystem Theory provides a comprehensive framework for understanding the complex and dynamic nature of interactions within a digital ecosystem. By examining how organizations collaborate, compete, and engage with various stakeholders, this theory highlights the importance of strategic ecosystem management. The organizations that effectively navigate these dynamics can enhance their innovation capabilities, resilience, and market positioning. By fostering collaboration, engaging customers, leveraging technology, and adhering to regulatory and societal considerations, businesses can create sustainable value and thrive in the interconnected digital landscape.

Business Process Reengineering (BPR) theory advocates for the radical redesign and optimization of business processes to achieve significant performance improvements. This theory, introduced by Michael Hammer and James Champy in the early 1990s, emphasizes the need for organizations to fundamentally rethink how they operate, moving beyond incremental improvements to achieve breakthrough results. BPR involves a comprehensive analysis and overhaul of end-to-end processes, focusing on eliminating inefficiencies, reducing costs, improving quality, and enhancing customer value. In the context of digital transformation, integrating digital technologies with BPR can amplify these benefits, enabling organizations to streamline operations, drive innovation, and create a competitive edge.

The core principle of BPR is to start with a clean slate, questioning existing processes and exploring how they can be completely redesigned to better serve the organizational goals. This approach contrasts with traditional process improvement methods that typically focus on minor tweaks and adjustments. BPR challenges organizations to think creatively and adopt a holistic view of their operations, considering how processes can be restructured to eliminate non-value-adding activities and align more closely with customer needs and strategic objectives.

Digital technologies play a significant role in the successful implementation of BPR. Technologies such as AI, robotic process automation (RPA), big data analytics, cloud computing, and the IoT provide powerful tools for redesigning and optimizing business processes. For instance, AI and machine learning can automate complex decision-making tasks, allowing organizations to process large volumes of data quickly and accurately. This automation reduces manual effort, minimizes errors, and frees the human resources for more strategic activities.

RPA is another digital technology that aligns well with BPR principles. RPA involves using software robots to automate repetitive, rule-based tasks that were traditionally performed by humans. By integrating RPA into reengineered processes, organizations can achieve higher levels of efficiency and consistency. For example, in

the finance sector, RPA can be used to automate invoice processing, reconciliation, and compliance checks, thus, significantly reducing the processing time and the operational costs.

Big data analytics is integral to BPR as it provides deep insights into the process performance and customer behavior. By analyzing large datasets, organizations can identify patterns, trends, and impediments that may not be apparent through the traditional analysis methods. These insights enable more informed decision-making and targeted process improvements. For example, in the retail industry, big data analytics can help identify inefficiencies in supply chain management, optimize inventory levels, and enhance demand forecasting accuracy.

Cloud computing supports BPR by providing scalable and flexible IT infrastructure that can adapt to the changing business needs. Cloud-based solutions enable organizations to implement and scale new processes quickly without the need for significant upfront investment in hardware and software. This flexibility is particularly valuable in dynamic markets where rapid adaptation to new opportunities and challenges is critical. Additionally, cloud computing facilitates collaboration and information sharing across geographically dispersed teams, enhancing coordination and efficiency.

The IoT contributes to BPR by connecting physical assets and devices to the digital world, thus, enabling real-time monitoring and control of processes. IoT devices can collect and transmit data on various operational parameters, such as equipment performance, environmental conditions, and resource utilization. This data can be used to optimize processes, predict maintenance needs, and reduce downtime. For example, in manufacturing, IoT-enabled sensors enables the real-time monitoring of machinery, facilitating the predictive maintenance and reducing the risk of unexpected breakdowns.

The integration of digital technologies with BPR not only enhances operational efficiency but also significantly improves customer value[4]. Digital tools enable organizations to deliver more personalized, responsive, and seamless experiences to their customers. For instance, AI-powered chatbots and virtual assistants can provide instant customer support, addressing queries and resolving issues promptly. Data analytics can help organizations understand customer preferences and tailor their offers accordingly, leading to higher customer satisfaction and loyalty.

Furthermore, digital technologies facilitate greater agility and innovation within the organizations. By enabling rapid prototyping, testing, and iteration of new processes and solutions, digital tools help the organizations stay ahead of the competition and respond swiftly to market changes. This agility is essential in today's fast-paced business environment, where customer expectations and technological advancements are continually evolving.

Thus, the integration of digital technologies amplifies the impact of BPR, enabling organizations to streamline operations, eliminate inefficiencies, and enhance

[4] P.C. Verhoef, T. Broekhuizen, Y. Bart et all, Digital transformation: A multidisciplinary reflection and research agenda, "Journal of business research" 2021; 122: 889-901.

customer value. Through a comprehensive and technology-enabled approach to BPR, businesses can transform their operations, deliver superior value to customers, and secure a competitive advantage.

Dynamic Capabilities Theory, developed by Teece, Pisano and Shuen, focuses on the ability of a company to adapt and innovate in a rapidly changing environment. In the perspective of digital transformation, this theory emphasizes the following insights:

- a company must develop the ability to sense the emerging digital opportunities and seize them quickly to effectively implement digital transformation. This involves being attuned to the technological advancements and market shifts and being ready to act on them;
- digital transformation often requires the reconfiguration of an organization's resources, which may include reallocating budgets, reskilling the employees, and restructuring processes. Dynamic capabilities theory emphasizes the importance of flexibility and adaptability in making these resource adjustments;
- digital transformation is inherently tied to innovation. Enterprises need to foster continuous learning culture to stay ahead in the digital landscape;
- organizations should be willing to pivot when necessary and their strategies should be dynamic rather than rigid[5].

Blue Ocean Strategy, crafted by W. Chan Kim and Renée Mauborgne, centers on the creation of unchallenged market spaces through the distinction of products or services from rivals. In the realm of digital transformation, entities should endeavor to forge 'blue oceans' by proffering exclusive value to clientele. This endeavor may entail the formulation of avant-garde digital products, services, or business models that conspicuously outshine the competition.

Through the application of digital technologies and automation, organizations frequently possess the means to reduce expenditures while concurrently furnishing superior value to their patrons. This expenditure reduction can serve as a pivotal catalyst in shaping a blue ocean by proposing reduced prices or heightened quality.

A customer-centric approach remains paramount; it is a fundamental tenet of Blue Ocean Strategy. This approach revolves around an unwavering concentration on what the customer genuinely esteems. Digital transformation should encompass an exhaustive grasp of customer requisites and the utilization of technology to gratify those prerequisites in the pioneering ways.

Thus, Blue Ocean Strategy often involves non-disruptive adoption, meaning that customers can easily understand and adopt the new offerings. This aligns with the idea that digital transformation should make the customer experience smoother and more convenient.

Theories like RBV, Dynamic Capabilities Theory and Blue Ocean Strategy offer insights into crafting effective digital transformation strategies. These theories are employed by enterprises to align digital initiatives with overarching business goals, create new value propositions, and differentiate themselves in the digital landscape.

[5] G. Vial, Understanding digital transformation: A review and a research agenda, "Managing digital transformation" 2000: 13-66.

Change management models such as Lewin's "Change Management Model" and Kotter's "8-Step Change Model" provide the frameworks for facilitating successful organizational change. Applying these models to digital transformation facilitates the management of resistance, effective communication, and the fostering of a culture of adaptability.

Lewin's "Change Management Model" provides a straightforward yet profound framework for managing the organizational change. This model is especially relevant in the context of digital transformation, where the organizations must navigate complex and often disruptive changes brought about by new technologies. Lewin's model comprises three stages: Unfreezing, Changing (or Transition), and Refreezing. Each stage represents a critical phase in the process of implementing and solidifying change within the organization, ensuring a structured approach to transforming business operations and culture.

The first stage, Unfreezing, involves preparing the organization for change by challenging the current state and creating a perceived need for transformation. This stage is essential in the digital transformation because it addresses the inherent resistance to change that can hinder the adoption of new technologies and processes. During this stage, leaders must communicate the reasons for the digital transformation clearly and compellingly. This communication should emphasize the urgency and benefits of adopting the digital technologies, such as enhanced efficiency, improved customer experiences, and increased competitiveness.

Unfreezing also requires addressing the emotional and psychological aspects of change. Employees might fear the unknown or worry about job security due to the automation and new digital tools. To mitigate these concerns, organizations should foster an open and supportive environment where employees can express their fears and receive reassurance. Engaging employees in the planning process, providing them with the necessary information, and offering training programs to build digital skills can help ease the transition. Leaders must actively listen to employee concerns and provide clear, consistent messaging about the positive impacts of the transformation.

The second stage, Changing (or Transition), is where the organization begins to implement the new processes, technologies, and behaviors. This stage is often the most challenging, as it involves moving from the familiar ways of working to the new, untested methods. In the context of digital transformation, this might include adopting new software systems, integrating AI and machine learning tools, implementing cloud-based solutions, or redesigning workflows to incorporate digital processes.

During the changing stage, clear and continuous communication is vital to ensure that everyone understands their roles and responsibilities in the new digital landscape. Change leaders should provide detailed implementation plans, set realistic timelines, and establish measurable goals to track the progress. Offering ongoing support and training to help employees adapt to new technologies and processes is crucial. Creating a culture of experimentation and learning can facilitate the transition, allowing employees to test new tools and approaches without the fear of failure.

The role of leadership is of particular significance during this phase. Leaders should model the desired behaviors, demonstrate commitment to the change, and maintain a visible presence throughout the transition. This leadership engagement reinforces the importance of the transformation and provides a source of motivation and inspiration for the entire organization. Additionally, forming the cross-functional teams can foster collaboration, and it may ensure that different perspectives and expertise are considered which, in turn, will enhance the overall success of the transformation.

The final stage, Refreezing, focuses on solidifying the changes and embedding them into the organizational culture and practices. This stage ensures that the new ways of working become the standard and that the benefits of the transformation are sustained over the long term. In the context of digital transformation, refreezing involves reinforcing new digital practices, continuously monitoring performance, and making necessary adjustments to optimize outcomes.

To achieve successful refreezing, it is important to celebrate early wins and recognize the efforts of individuals and teams who have contributed to the transformation. This recognition helps to build the momentum and reinforces the positive aspects of the change. Establishing new policies, procedures, and metrics aligned with the digital transformation goals can help institutionalize the changes. Regular feedback mechanisms should be implemented to gather insights and address any emerging issues promptly.

Continuous improvement is also a significant aspect of the refreezing stage. Organizations should remain agile and responsive to technological advancements and market shifts, ensuring that their digital capabilities evolve in line with external changes. This may involve periodic reviews of digital strategies, ongoing training, and development programs, and fostering a culture of innovation and adaptability.

Thus, Lewin's "Change Management Model" provides a valuable framework for guiding organizations through the complex process of digital transformation. By following the three stages of Unfreezing, Changing, and Refreezing, organizations can effectively manage the transition to new digital technologies and processes. The unfreezing stage emphasizes the importance of preparing the organization and addressing resistance to change. The changing stage focuses on the implementation and the support required to adopt the new ways of working. Finally, the refreezing stage ensures that the changes are solidified and sustained over time. By leveraging Lewin's model, organizations can navigate the challenges of digital transformation, achieve significant performance improvements, and build a resilient and future-ready organization.

Kotter's "8-Step Change Model" provides a structured and comprehensive framework for managing change within organizations. In the context of digital transformation, this model offers a clear roadmap to help organizations successfully adopt and integrate new digital technologies and processes. The model consists of eight steps, each critical for driving and sustaining change, ensuring that the organization can adapt effectively to the rapidly evolving digital landscape.

The first step is Creating a Sense of Urgency which involves building a compelling case for why digital transformation is necessary. This step is crucial because it addresses the inertia and the resistance that often accompany change. Leaders must communicate the urgent need for digital adoption by highlighting the potential benefits, such as improved efficiency, enhanced customer experiences, and increased competitiveness. They must also underscore the risks of inaction, including falling behind competitors or losing market share. By creating a sense of urgency, leaders can galvanize the organization, generating the momentum needed to embark on the transformation journey.

The second step, Forming a Powerful Coalition, entails assembling a group of influential leaders and stakeholders who are committed to driving the change. This coalition should include individuals from various levels and departments within the organization to ensure broad support and diverse perspectives. In the context of digital transformation, the coalition might consist of senior executives, IT leaders, and department heads who can champion the adoption of new technologies. This powerful coalition is essential for guiding the organization through the complexities of the transformation process, providing leadership and support at every stage.

The third step, Creating a Vision for Change, requires the development of a clear and compelling vision that articulates the goals and benefits of the digital transformation. This vision serves as a roadmap, providing direction and inspiration for the change efforts. It should clearly outline what the organization aims to achieve through digital transformation and how it will benefit both the business and its stakeholders. A well-defined vision helps align the organization's efforts and ensures that everyone is working towards the same objectives. Leaders must communicate this vision effectively to ensure that all employees understand and embrace the desired future state.

The fourth step, Communicating the Vision, involves disseminating the vision throughout the organization using various channels and formats. Consistent and transparent communication is key to reinforcing the vision and keeping it at the forefront of employees' minds. In the context of digital transformation, communication should highlight the benefits of new technologies, address potential concerns, and provide regular updates on progress. Leaders should also use communication to solicit feedback and encourage dialogue, fostering a sense of inclusion and ownership among employees. Effective communication ensures that everyone is informed and engaged, which is critical for the success of the transformation.

The fifth step, Removing Obstacles, focuses on identifying and eliminating the barriers that could hinder the change process. In digital transformation, obstacles might include outdated systems, lack of skills, or resistance from employees. Leaders need to address these barriers proactively by providing the necessary resources, training, and support. This might involve upgrading IT infrastructure, offering digital literacy programs, and creating an environment where employees feel safe to experiment and adapt to new technologies. By removing such obstacles, leaders can facilitate a smoother transition and increase the likelihood of successful adoption of digital tools and processes.

The sixth step, Creating Short-Term Wins, involves achieving and celebrating early successes to build momentum and demonstrate the tangible benefits of the change initiative. In digital transformation, short-term wins might include successful pilot projects, quick efficiency gains from automation, or early improvements in customer satisfaction. These wins provide evidence that the transformation is on the right track and help to sustain enthusiasm and commitment among employees. Celebrating short-term wins also reinforces the positive impact of digital technologies and boosts morale, encouraging further efforts towards the transformation.

The seventh step, Building on the Change, emphasizes the importance of sustaining change by continuously seeking opportunities for further improvement. Digital transformation is an ongoing process, and organizations must remain agile and responsive to new developments. Leaders should use the credibility gained from short-term wins to drive more significant, long-term changes. This might involve scaling successful pilots across the organization, integrating additional digital tools, and continuously refining processes to enhance efficiency and innovation. Building on the change ensures that the organization continues to evolve and adapt, maintaining its competitive edge in a dynamic market.

The final step, Anchoring the Changes in the Corporate Culture, focuses on embedding the new ways of working into the organizational culture to ensure that the changes are sustainable. This involves reinforcing the new behaviors, practices, and mindsets that support the digital transformation. Leaders play a crucial role in modeling these behaviors and recognizing those who exemplify the new ways of working. Establishing new policies, procedures, and performance metrics aligned with the digital transformation goals can help institutionalize the changes. Furthermore, continuous learning and development (L&D) programs can assist in maintaining a culture of innovation and adaptability, thereby ensuring that the organization remains future-ready.

Thus, Kotter's "8-Step Change Model" provides a valuable framework for managing digital transformation effectively. By following these eight steps, i.e. creating a sense of urgency, forming a powerful coalition, creating a vision for change, communicating the vision, removing obstacles, creating short-term wins, building on the change and anchoring the changes in the corporate culture, enterprises can navigate the complexities of digital transformation and achieve sustainable success. This structured approach ensures that the change process is well-coordinated, inclusive, and aligned with the organization's strategic objectives, ultimately leading to a more resilient and future-ready business.

Digital leadership involves guiding organizations through the complexities of digital transformation by leveraging technology to enhance business processes, create new value propositions, and drive competitive advantage. Visionary digital leaders possess a forward-thinking mindset and a deep understanding of how digital technologies can be integrated into the organizational strategy. They are adept at identifying emerging trends, envisioning the future state of the organization, and communicating a compelling vision that inspires and aligns employees towards common goals.

One of the foundational theories in digital leadership is the concept of "transformational leadership", which emphasizes the importance of inspiring and motivating employees to achieve extraordinary outcomes. Transformational leaders in the digital era are characterized by their ability to articulate a clear vision of digital transformation, foster an environment of trust and collaboration, and encourage innovation and creativity. By setting high expectations and providing the necessary support and resources, transformational leaders empower employees to take ownership of digital initiatives and encourage continuous improvement.

Transformational leaders understand that digital transformation is not just about implementing new technologies but also about changing the organizational culture and mindset. They emphasize the need for a culture that is open to change, experimentation, and continuous learning. This involves creating a safe space for the employees to explore new ideas and take calculated risks without the fear of failure. Leaders must also be committed to their own continuous learning and development to stay ahead of technological advancements and industry trends.

In the context of digital transformation, transformational leaders play a critical role in fostering innovation. They encourage employees to think creatively and explore new ways of leveraging digital technologies to solve business problems and create value. By promoting a culture of innovation, leaders ensure that the organization remains competitive and can adapt to the changing market conditions. This involves providing employees with the tools, resources, and autonomy they need to innovate and experiment. Leaders also acknowledge and reward innovative efforts, reinforcing the significance of creativity and continuous improvement in the organization's values and practices.

Effective communication is another crucial aspect of transformational leadership in the digital era. Leaders must communicate the vision for digital transformation clearly and consistently, ensuring that all employees understand the strategic goals and their role in achieving them. This involves using various communication channels and methods to reach different audiences within the organization. Regular updates and transparent communication about the progress and impact of digital initiatives aid in building trust and keeping employees engaged and motivated.

Building a strong team is essential for successful digital leadership. Transformational leaders recognize the importance of attracting and retaining top talents with the skills and mindset needed for digital transformation. This involves creating a supportive and inclusive work environment where employees feel valued and empowered. Leaders should invest in the employee development through training programs, mentoring, and opportunities for career growth. By building a team of skilled and motivated individuals, leaders can drive digital initiatives more effectively and achieve better outcomes.

Transformational leaders also focus on building strategic partnerships and collaborations. In the digital age, no organization can succeed in isolation. Leaders must seek out partnerships with other organizations, startups, and technology providers to leverage external expertise and resources. These collaborations can help accelerate

digital transformation by providing access to new technologies, ideas, and market opportunities. Leaders should also encourage collaboration within the organization, breaking down silos and fostering cross-functional teamwork to drive innovation and improve efficiency.

Finally, transformational leaders understand the importance of data and analytics in driving digital transformation. They leverage data to make informed decisions, measure the impact of digital initiatives, and continuously improve the processes and strategies. This involves investing in data analytics capabilities and fostering a data--driven culture within the organization. By using data to gain insights into customer behavior, market trends, and operational performance, leaders can identify opportunities for improvement and innovation.

In addition to transformational leadership, several other theories are of significant importance with regard to digital leadership. These theories provide diverse perspectives and strategies for guiding organizations through the complexities of digital transformation. Among these are "servant leadership", "adaptive leadership", and "authentic leadership". Each of these theories offers a unique insight into how leaders can effectively manage change, inspire their teams, and foster a culture of innovation and continuous improvement in a digital age.

"Servant leadership" is a theory that emphasizes the leader's role as a caretaker and a supporter of their team. This leadership style focuses on serving the needs of the employees by empowering them and helping them grow both personally and professionally. In the context of digital transformation, servant leaders prioritize the well-being and development of their team members, recognizing that a motivated and skilled workforce is essential for successful digital initiatives. They actively listen to their employees, provide the necessary resources, and support, and create an inclusive environment where everyone feels valued and heard. By fostering a sense of community and collaboration, servant leaders can drive digital transformation more effectively, ensuring that the organization remains agile and resilient in the face of change.

"Adaptive leadership" is another crucial theory for digital leadership. This approach emphasizes the importance of flexibility and responsiveness in a rapidly changing environment. Adaptive leaders are skilled at navigating uncertainty and complexity, making quick decisions based on evolving information. They encourage their teams to embrace change and view challenges as opportunities for growth and innovation. In the digital age, where technological advancements and market dynamics are constantly shifting, adaptive leadership is vital for staying competitive. These leaders focus on continuous learning and development, for both themselves and their teams, ensuring that they can quickly adapt to new technologies and methodologies. By fostering a culture of experimentation and learning, adaptive leaders can help their organizations thrive in the digital era.

"Authentic leadership" is characterized by leaders who are genuine, transparent, and ethical. They lead by example, demonstrating integrity and building trust with their employees. Authentic leaders are self-aware and understand their values and

strengths, which they leverage to inspire and guide their teams. In the context of digital transformation, authenticity is crucial for building a culture of trust and openness. Employees are more likely to embrace change and take risks when they believe their leaders are honest and have their best interests at heart. Authentic leaders also encourage open communication and feedback, creating an environment where employees feel safe to express their ideas and concerns. This openness fosters innovation and collaboration, essential for successful digital initiatives.

"Distributed leadership" is a theory that recognizes leadership as a collective process rather than the sole responsibility of a single individual. In the digital age, where collaboration and cross-functional teams are key, distributed leadership is particularly relevant. This approach involves delegating leadership roles and responsibilities to various team members based on their expertise and strengths. By adopting the distributed leadership approach, organizations can leverage diverse perspectives and skills, enhancing innovation and problem-solving. Distributed leadership also empowers employees, giving them a sense of ownership and accountability for digital initiatives. This collaborative approach ensures that the organization can respond more quickly and effectively to changes and challenges in the digital landscape.

"Transactional leadership" is another theory that, while traditionally focused on maintaining the status quo through structured tasks and rewards, can still play a role in digital leadership when combined with other approaches. Transactional leaders set clear goals and expectations, providing rewards and recognition for achieving targets. In the context of digital transformation, transactional leadership can help ensure that day-to-day operations continue to run smoothly while the organization navigates change. By providing structure and stability, transactional leaders can create a solid foundation for digital initiatives, complementing more transformational or adaptive approaches.

"Transformational leadership", as previously discussed, is essential in driving digital transformation. This approach places emphasis on inspiring and motivating employees to achieve extraordinary outcomes, fostering a culture of innovation and continuous improvement. Transformational leaders in the digital era articulate a clear vision for digital transformation, encourage creativity and experimentation, and provide the necessary support and resources for their teams to succeed. By setting high expectations and creating the environment of trust and collaboration, transformational leaders empower employees to take ownership of digital initiatives and drive change throughout the organization.

Thus, digital leadership encompasses a variety of theories that provide diverse strategies and perspectives for guiding organizations through the digital transformation. Visionary digital leaders possess a forward-thinking mindset and a deep understanding of how digital technologies can be integrated into the organizational strategy. They are adept at identifying emerging trends, envisioning the future state of the organization, and communicating a compelling vision that inspires and aligns employees towards common goals. Transformational leadership is a foundational theory in digital leadership, which emphasizes the importance of inspiring

and motivating employees to achieve extraordinary outcomes. By fostering a culture of innovation, effective communication, strong teamwork, strategic partnerships, and data-driven decision-making, transformational leaders enable successful digital transformation and position their organizations for long-term success.

Servant leadership focuses on empowering and supporting employees, adaptive leadership emphasizes flexibility and responsiveness, and authentic leadership highlights the importance of integrity and trust. Distributed leadership recognizes the collective nature of leadership, transactional leadership provides structure and stability, and transformational leadership inspires and motivates employees to achieve extraordinary outcomes. By integrating these theories, digital leaders can create a comprehensive approach to navigating the complexities of digital transformation, fostering a culture of innovation, and ensuring long-term organizational success.

Another important framework is Clayton Christensen's "theory of disruptive innovation", which explains how new technologies can disrupt the established markets and create new opportunities. According to this theory, disruptive technologies often begin as low-cost alternatives that initially cater to niche markets or less demanding customers. Over time, these technologies improve and evolve to meet the needs of mainstream customers, eventually overtaking the established products and services. This process of disruption can fundamentally change the industries, rendering established companies obsolete if they fail to adapt.

Digital leaders must be vigilant in identifying and embracing disruptive technologies with the potential to revolutionize their industry. This involves staying abreast of technological advancements and market trends, as well as being open to new and unconventional ideas. By recognizing the early signs of disruption, leaders can proactively invest in and integrate these technologies into their organizational strategy. This foresight is crucial for maintaining a competitive edge and ensuring long-term success in a rapidly evolving digital landscape.

To effectively leverage the disruptive innovation, digital leaders must foster a culture of experimentation within their organizations. This involves encouraging employees to explore new ideas, take calculated risks, and learn from failures. By creating an environment where experimentation is valued and supported, leaders can facilitate innovation and uncover new opportunities for growth. This culture of experimentation is essential for staying ahead of competitors and continuously improving the products, services, and processes.

Moreover, digital leaders must be adept at managing the balance between sustaining existing operations and exploring disruptive innovations. This often requires creating separate teams or units dedicated to exploring and developing disruptive technologies, while the core business focuses on incremental improvements and maintaining current operations. This dual approach ensures that the organization can continue to meet the needs of the existing customers while also positioning itself for future growth.

Effective communication is another critical aspect of leveraging disruptive innovation. Leaders must clearly articulate the vision and strategic importance of the

disruptive technologies to all stakeholders, including employees, investors, and customers. By communicating the potential benefits and long-term impact of these innovations, leaders can build buy-in and support throughout the organization. This alignment is crucial for mobilizing the resources and driving the successful implementation of disruptive technologies.

In addition to fostering a culture of experimentation and effective communication, digital leaders must also invest in the necessary infrastructure and capabilities to support the disruptive innovation. This includes investing in research and development, acquiring new technologies, and developing the skills and expertise of employees. By providing the necessary tools and resources, leaders can ensure that their teams are well equipped to explore and implement the disruptive innovations.

Collaboration and partnerships also play a vital role in leveraging disruptive innovation. Digital leaders should seek out strategic alliances with startups, technology providers, and other organizations that can provide complementary skills, knowledge, and resources. These partnerships can accelerate the development and the adoption of disruptive technologies, enabling organizations to stay ahead of the curve and capitalize on new opportunities.

Additionally, digital leaders must be prepared to make bold decisions and pivot their strategies in response to the emerging disruptions. This requires a willingness to challenge the status quo and embrace change, even when it involves significant risks. By being flexible and adaptive, leaders can navigate the uncertainties of disruptive innovation and position their organizations for long-term success.

Thus, Clayton Christensen's "theory of disruptive innovation" offers valuable insights into how new technologies can disrupt the established markets and create new opportunities. Digital leaders have to be vigilant in identifying and embracing disruptive technologies that have the potential to revolutionize their industry. By fostering a culture of experimentation, encouraging the exploration of new ideas, and effectively managing the balance between sustaining current operations and pursuing disruptive innovations, leaders can position their organizations to capitalize on these opportunities and maintain a competitive edge.

Conclusion

The digital transformation is based on a set of principles, including the understanding of the customer needs, fostering an innovative culture, investing in employee training, and ensuring cybersecurity. These principles enable companies to effectively adopt innovative technologies, achieve strategic goals, gain a competitive edge in the market, and ensure their competitiveness in the modern business environment.

The theoretical foundations collectively inform how organizations approach, plan and execute enterprise digital transformation. By drawing upon these principles, organizations can develop comprehensive strategies that leverage digital technologies to drive growth, enhance competitiveness and adapt to the evolving digital landscape.

Bibliography

Kane G.C., Palmer D., Phillips A.N., Kiron D., Buckley N., Strategy, not technology, drives digital transformation, MIT Sloan Management Review, 2015.

Sebastian I.M., Ross J.W., Beath C. et all, How big old companies navigate digital transformation. Strategic information management, Routledge 2020.

Teece D. J., Business models and dynamic capabilities, "Long range planning" 2018; 51(1): 40-49.

Verhoef P.C., Broekhuizen T., Bart Y. et all, Digital transformation: A multidisciplinary reflection and research agenda, "Journal of business research" 2021; 122: 889-901.

Vial G., Understanding digital transformation: A review and a research agenda, "Managing digital transformation" 2000: 13-66.

*Hanna Zhosan**
*Gabriel Jerry Otu***

ANALYSIS OF THE ROLE OF DIGITALIZATION IN ENHANCING THE EFFICIENCY OF BUSINESS OPERATIONS

Analiza roli cyfryzacji w zwiększaniu efektywności operacji biznesowych

*PhD., Kherson State Agrarian and Economic University in Ukraine, ORCID: 0000-0002-3577-6701
**PhD., Nasarawa State University in Keffi, ORCID: 0009-0004-8750-6596

Streszczenie

Artykuł bada potencjalne kierunki wdrażania narzędzi cyfrowych w działalności przedsiębiorstw w regionie Chersonia, na podstawie analizy aktualnych trendów i potrzeb. Zidentyfikowano dziesięć kluczowych zadań technicznych, w tym automatyzację produkcji, zarządzanie projektami, analizę danych, handel elektroniczny i obsługę klienta. Szczególną uwagę poświęcono możliwościom poprawy zarządzania finansami i procesami biznesowymi poprzez wykorzystanie sztucznej inteligencji (AI) i narzędzi analitycznych. W artykule podkreślono, że cyfryzacja może przynieść znaczące korzyści, takie jak zwiększona produktywność, obniżone koszty, lepsza komunikacja i zwiększona konkurencyjność. W szczególności podkreślono wykorzystanie handlu elektronicznego, elektronicznych systemów zarządzania dokumentami, narzędzi analitycznych i lepszej interakcji z klientami. W artykule zwrócono również uwagę na trendy w technologiach cyfrowych, takie jak rosnąca popularność technologii chmurowych, sztucznej inteligencji i analizy danych. Podsumowując stwierdzono, że wdrożenie narzędzi cyfrowych jest kluczowym krokiem do zapewnienia zrównoważonego rozwoju i poprawy efektywności przedsiębiorstw w nowoczesnym środowisku cyfrowym.

***Słowa kluczowe**: narzędzia cyfrowe, region Chersoń, automatyzacja produkcji, analiza danych, sztuczna inteligencja (AI)*

Summary

The article explores potential directions for the implementation of digital tools in the activities of enterprises in the Kherson region, based on an analysis of current trends and needs. It identifies ten key technical tasks, including production automation, project management, data analytics, e-commerce, and customer service. Special attention is given to the opportunities for improving financial management

and business processes through the use of artificial intelligence (AI) and analytical tools. The article highlights that digitalization can offer significant advantages, such as increased productivity, reduced costs, improved communication, and enhanced competitiveness. Specifically, it emphasizes the use of e-commerce, electronic document management systems, analytical tools, and improved customer interaction. The article also notes trends in digital technologies, such as the growing popularity of cloud technologies, AI, and data analytics. In conclusion, it states that the implementation of digital tools is a crucial step for ensuring sustainable development and improving the efficiency of enterprises in the modern digital environment.

Key words: digital tools, Kherson region, production automation, data analytics, artificial intelligence (AI)

To evaluate the degree of digitalization among enterprises in the Kherson region, one must consider various factors, with a central focus being the integration and effective application of information and communication technologies (ICT). The assessment of digitalization involves examining both the presence and the impact of ICT within these enterprises.

The presence of ICT can be gauged by investigating the extent to which businesses have adopted computing hardware and software for various functions such as accounting, administrative management, production control, marketing, and sales. Additionally, it is important to assess the use of cloud services, email, and social media platforms, as these technologies are integral to contemporary business operations.

The effectiveness of ICT usage is evaluated through its influence on operational efficiency and performance outcomes. This includes analyzing reductions in administrative and accounting costs, which often result from streamlined processes and automated systems. Furthermore, the impact on employee productivity is examined, with a focus on how digital tools facilitate more efficient work practices. The optimization of production processes, reflected in reduced time requirements and enhanced workflow management, is another critical aspect. Lastly, the effect of digitalization on sales performance is considered, particularly how improved technological capabilities contribute to increased revenue and growth.

By evaluating these factors, a comprehensive understanding of how digitalization enhances business efficiency and operational effectiveness in the Kherson region can be achieved.

To assess the level of digitalization among enterprises in the Kherson region, a comprehensive approach can be employed, including surveys of employees regarding ICT usage and an analysis of available software and cloud services within the enterprises. Additionally, comparative studies with other regions and industries can provide insights into the digital maturity of the Kherson region relative to others.

According to data from the State Statistics Service of Ukraine, in 2020, there were 8,116 enterprises in Kherson Oblast, comprising 3 large, 306 medium, and 7,807

small enterprises, of which 6,888 were micro-enterprises. Over 99% of these enterprises had internet access, indicating that the use of technology and the internet is nearly ubiquitous in the region. However, only 25% of enterprises in Kherson Oblast had their own websites, and less than 10% actively used social media for advertising their products and services.

Between 2018 and 2020, the Ministry of Economic Development, Trade, and Agriculture of Ukraine reported the establishment of over 50 innovative enterprises in Kherson Oblast focused on the development and implementation of digital technologies. Furthermore, in 2020, the „Electronic Kherson" program was launched, aimed at creating a unified electronic space for service provision and project implementation utilizing digital technologies[1].

The evaluation of digitalization levels indicates that most enterprises in the Kherson region are still in the early stages of digitalization. While many have basic electronic resources, such as websites and social media profiles, these resources are not yet fully utilized to attract new clients or enhance operational efficiency. This suggests that there is considerable potential for further development in digital capabilities within the region.

Most enterprises in the Kherson region lack a comprehensive digital strategy and action plan for digitalizing their operations. Some enterprises also lack experience with advanced software and technologies that are crucial for automating and optimizing business processes[2].

However, the presence of electronic resources and the use of certain programs for process automation indicate an interest in implementing digital tools and advancing the digital economy. Effective use of digital technologies is essential for businesses to attract new customers, increase sales volumes, and improve the quality of products and services.

Thus, enterprises in the Kherson region require support and enhanced competence in digitalization to ensure sustainable development and competitiveness in the contemporary digital landscape.

Certain sectors already exhibit a high level of digitalization, such as e-commerce and internet marketing. Conversely, industries like manufacturing, transportation, construction, healthcare, and education may require substantial efforts to achieve effective digitalization.

It is also important to note that the level of digitalization may vary based on the size and ownership structure of the enterprises. Larger enterprises generally have more resources to invest in digitalization and the development of their own information systems.

Despite being in the 21st century, a significant number of entrepreneurs remain skeptical about adopting cutting-edge developments and technologies, and even

[1] G. Bedianashvili, H. Zhosan, S. Lavrenko, Modern digitalization trends of Georgia and Ukraine, "Management, Economic Engineering in Agriculture and Rural Development" 2022; 22(3): 57-74.

[2] BMWi, Industrie 4.0 und Digitale Wirtschaft – Impulse für Wachstum, Beschäftigung und Innovation, Bundesministerium für Wirtschaft und Energie, Berlin 2015.

more so about integrating them into their businesses. This widespread issue is known as „neophobia".

Neophobia, or the fear of new technologies, is a common barrier to the adoption of digital tools within enterprises. This apprehension can be prevalent among employees, managers, and other business stakeholders who lack familiarity with these tools and do not fully understand their benefits.

To address this challenge, it is essential to implement regular training, education, and consultations on the use of digital tools for all business participants involved in their deployment. Actively involving employees in the development and implementation process of new technologies can enhance their awareness and readiness for change.

A strategic approach to the introduction of digital tools should be developed, featuring a gradual and measured deployment of new technologies. This approach helps to mitigate stress and neophobia among employees and managers. Additionally, maintaining a positive attitude and motivating staff by emphasizing the benefits that digital tools can bring to the enterprise and individual employees is crucial.

By addressing neophobia effectively, the process of integrating digital tools into businesses can be significantly streamlined, leading to more successful adoption and utilization of these technologies. Providing adequate support, training, and motivation to employees engaged in the implementation and use of digital tools is vital for overcoming this barrier.

One effective approach to supporting employees in the adoption of digital tools is through comprehensive training and workshops designed to enhance their competence and confidence in using these technologies. Providing opportunities for hands--on experience with digital tools – such as allowing employees to integrate them into their daily tasks – is also crucial.

In addition to training, motivation plays a vital role in encouraging the use of digital tools. Management should implement strategies to motivate employees, which might include financial incentives, bonuses for successful utilization of these tools, or incorporating their use into employee performance evaluations.

Furthermore, it is essential to provide adequate support for employees encountering technical issues with digital tools. Establishing a dedicated technical support service to address and resolve these problems can ensure that employees have the assistance they need.

Addressing neophobia and offering appropriate support and motivation are key factors in the successful implementation and use of digital tools within an organization. Effective management involves allocating time for employees to familiarize themselves with new tools, ensuring they receive proper education and training to maximize their use. Additionally, providing robust technical support is critical to resolving any issues that may arise.

Considering the organizational culture is also important. Open communication between management and staff helps secure their support and engagement in the implementation of digital tools.

Overall, the success of digital tool implementation in a company depends on clear communication, adequate support, and training for employees, as well as attention to the organization's cultural context.

According to a survey of 7,502 businesses conducted worldwide between March 30 and April 12, 2022, by Morning Consult for IBM, while an increasing number of enterprises recognize the importance of artificial intelligence (AI) reliability, most have not taken measures to ensure their AI systems are reliable and responsible. The survey revealed several shortcomings:

- 74% of businesses have not addressed inadvertent bias in their AI systems,
- 68% do not track performance changes and model updates,
- 61% have not ensured their AI decisions can be explained,
- 60% have not developed ethical AI policies.

Among the barriers to successful AI implementation, respondents identified several key issues:

- 34% of businesses cited limited AI skills, experience, or knowledge as a hindrance,
- 29% mentioned high costs,
- 25% reported a lack of tools or platforms for model development,
- 24% found projects to be too complex or difficult to integrate or scale,
- 24% faced challenges related to data complexity.

Despite these challenges, two-thirds of the surveyed businesses are either implementing or planning to use AI to achieve their sustainability goals.

In evaluating the level of digitalization among businesses in the Kherson region, various aspects were analyzed, including the availability and use of digital technologies, internet and computing resources, digital solutions in business processes, and the level of digital culture among entrepreneurs. The analysis indicated that many enterprises in Kherson are already integrating digital technologies into their operations, such as e-commerce, online marketing, and process automation. However, a significant number of businesses have not fully utilized the potential of digital tools or have limited access to them[3].

The assessment highlighted several barriers to the rapid adoption of digital technologies in the Kherson region, including insufficient staff knowledge and skills, financial constraints, and inadequate infrastructure. Addressing these challenges is crucial for advancing digitalization in the region.

Conclusions also suggest that a supportive business environment, government incentives, and encouragement of innovative initiatives can stimulate the digitalization process. It is essential to develop digital technology infrastructure, promote digital literacy among entrepreneurs, and ensure access to training programs and consultations for effective implementation of digital tools.

In summary, the assessment of the digitalization level among businesses in the Kherson region reveals that while some enterprises are successfully utilizing digital

[3] C. Boueé, S. Schaible, Die Digitale Transformation der Industrie. Studie: Roland Berger und BDI. Online: https://www.researchgate.net/publication/315857925_Die_digitale_Transformation_von _Geschaftsmodellen_gestalten.

technologies, there is a clear need for further development and support in this area. The implementation of digital tools can enhance efficiency, competitiveness, and innovation potential, which are crucial factors for success in the contemporary business environment.

Currently, there is a wide array of programs available that can be beneficial for businesses. Here are a few examples of modern software and their applications:

- CRM Systems (Customer Relationship Management) – these programs enable businesses to manage interactions with customers effectively. CRM systems allow for the storage of customer data, tracking of order history and communications, data analysis, and development of strategies to boost sales and customer satisfaction.
- ERP Systems (Enterprise Resource Planning) – ERP programs integrate various business processes, from finance to logistics, into a unified system. They help improve management efficiency, reduce administrative costs, and increase employee productivity.
- BI Systems (Business Intelligence) – BI programs facilitate the analysis of large volumes of data and the formulation of strategies based on this information. BI systems are used for market and competitor analysis, identifying customer needs, forecasting market and business developments.
- Manufacturing Automation Systems – these systems automate production processes, helping to reduce production costs, enhance product quality, and increase worker productivity. For example, Manufacturing Execution Systems (MES) assist in planning and controlling production processes, collecting and analyzing production data, managing quality, and improving resource utilization. Warehouse Management Systems (WMS) optimize warehouse management, enhance storage space usage, increase order processing speed, and reduce errors in product shipping.

One notable example in the Ukrainian market is the company SAB (Spilka Avtomatizatoriv Biznesu), which offers development and implementation of business automation software.

Overall, the successful adoption and integration of these digital tools can significantly contribute to improving the operational efficiency and competitive edge of businesses in the Kherson region.

Another significant example is Supply Chain Management (SCM) software. SCM solutions are designed to optimize the processes involved in the supply chain, reducing logistics costs, improving demand forecasting accuracy, and ensuring effective interaction with suppliers and customers. This type of software helps streamline procurement, inventory management, and distribution, which is crucial for maintaining an efficient supply chain.

Additionally, Project Management Software (PMS) plays a vital role in planning and overseeing project execution. PMS tools facilitate task distribution among project participants, track progress, and manage deadlines. Effective communication and collaboration are key aspects of PMS, enabling team members to exchange documents, share information, and promptly address changes

in project plans and schedules. Popular PMS tools include Asana, Trello, Jira, Basecamp, and Microsoft Project. Each of these programs offers unique advantages and limitations, so selecting the appropriate PMS depends on the specific needs and characteristics of the project.

Furthermore, there are various other business software solutions such as Customer Relationship Management (CRM) systems, Electronic Document Management Systems (EDMS), Manufacturing Execution Systems (MES), and Enterprise Resource Planning (ERP) programs. Each of these systems addresses specific business needs and contributes to optimizing operations and enhancing efficiency[4].

The analysis indicates that contemporary information programs provide businesses with tools for effective data collection, processing, and analysis. These programs assist managers in making informed decisions based on accurate information, which boosts operational efficiency and strategic planning.

Modern information systems also facilitate the automation of numerous business processes. By automating routine tasks, these systems free up resources and time for employees to focus on more critical and creative activities. This leads to increased productivity and a reduction in the likelihood of errors.

Moreover, information programs enhance communication and collaboration within the organization. They offer mechanisms for efficient information exchange between different departments and employees, which helps avoid delays, improves coordination, and accelerates decision-making.

The analysis also highlights that successful implementation of information programs requires careful planning, coordination with external software vendors, and robust data security measures. Proper implementation and support are essential for achieving the maximum efficiency and success of the business[5].

Overall, modern information programs prove to be powerful tools for achieving operational efficiency and competitive advantages. They contribute to improved management, increased productivity, and streamlined business processes. However, the successful adoption of these programs requires thorough planning and continuous support to ensure their effective integration and performance within the enterprise[6,7].

According to the „Action Plan for Implementation in 2021-2023, Strategy for the Development of the Kherson Region for the Period 2021-2027", several technical tasks for the digitalization sector have been identified. Here are ten potential directions for implementing digital tools:

– Production Automation – using digital tools for automating production processes can significantly reduce labor costs, improve product quality, and increase

[4] BCG, Featured insights and perspectives from BCG. Online: https://www.bcg.com/ru-ru/featured-insights/thought-leadership-ideas.

[5] H. Bouwman, S. Nikou, F. J. Molina-Castillo, Mark de Reuver. The impact of digitalization on business models, "Digital Policy, Regulation and Governance" 2018; 20(2): 105-124.

[6] S. Brennen, Digitalization and Digitization. Online: http://culturedigitally.org.

[7] Digital Vortex, How Digital Disruption Is Redefining Industries. Online: https://www.cisco.com/c/dam/en/us/solutions/collateral/industry-solutions/digital- vortex-report.pdf.

worker productivity. This may include the implementation of robotic systems, automated lines, and intelligent management systems.

- Project Management – tools for project management provide effective planning, task control, task distribution among project participants, progress tracking, and urgent task management. Tools such as Asana, Trello, and Microsoft Project help optimize processes and ensure transparency in project management.
- Analytics and Business Intelligence – digital tools for data analysis allow for identifying trends and forecasting risks, which is crucial for making informed management decisions. Business Intelligence (BI) systems help enterprises gain valuable insights from data, optimize strategies, and improve operational efficiency.
- E-Commerce – developing e-commerce through digital tools enables increased sales volumes, enhances product competitiveness, and reduces advertising and marketing costs. Integrating e-commerce platforms and optimizing online sales can significantly improve business performance.
- Customer Service – dtilizing digital tools for customer support ensures high-quality service and increases customer loyalty. Tools such as online chat on a website or mobile app allow customers to quickly get answers to their questions and resolve issues. Additionally, electronic feedback systems, including email and social media, can be used to interact with customers and gather feedback.

These directions for implementing digital tools will not only contribute to the development of enterprises in the Kherson region but also help ensure their competitiveness in the modern digital environment. Effective implementation of these directions will require proper planning, staff training, and support from the government and innovation initiatives.

- Production – the use of digital tools in production can enhance the efficiency and accuracy of production processes. For example, automation systems allow for the monitoring and optimization of production processes, which reduces costs and increases productivity. Digital tools can also be used for quality control and monitoring of products.
- Marketing – digital tools can be valuable in advertising and marketing activities. For instance, social media and contextual advertising can attract new customers and boost sales. Additionally, digital tools can be used to analyze customer behavior and forecast their needs.
- Human Resource Management – the use of digital tools can support effective human resource management. For example, Human Resource Management Systems (HRMS) can help with efficient recruitment, training, and evaluation of employees, leading to improved productivity and work quality. Furthermore, digital tools such as video conferencing and virtual meetings can help remote employees stay integrated with the team and participate in meetings and discussions.
- Production Management – automation systems can aid enterprises in achieving more efficient and rapid production processes. For instance, software for inventory management and production planning can help reduce costs and increase productivity. Additionally, project management systems can ensure effective co-

ordination among project participants and timely identification and resolution of issues.

- Marketing and Advertising – digital tools can assist enterprises in attracting more customers and enhancing their brand. For example, using social media for advertising allows businesses to reach a larger target audience and understand their needs and desires. Moreover, internet marketing and contextual advertising can improve the effectiveness of advertising campaigns and attract more customers.
- Financial Management – digital tools can help enterprises improve financial management and reduce risks. For instance, electronic accounting and financial reporting systems allow for quick and accurate collection and analysis of financial information. Additionally, digital tools can automate accounting processes, reducing the likelihood of errors and ensuring more precise and timely financial operations.

Additionally, the use of digital tools can help businesses enhance the efficiency of financial management through data analysis tools such as machine learning and artificial intelligence. These technologies allow for more precise and in-depth analysis of financial data, including budgeting forecasts, risk detection, and identifying opportunities for profit growth.

Overall, this contributes to more effective and accurate financial management, promoting stable development and competitive advantage in the market.

However, several key trends are already emerging that will shape the future development of digital tools:

- Cloud Technologies and Internet of Things (IoT) – the continued growth of cloud technologies and IoT in business management is anticipated. Cloud technologies enable real-time data storage, processing, and sharing, improving decision-making and management efficiency. IoT, in turn, allows real-time interaction with various devices and equipment, enhancing productivity and reducing management costs.
- Artificial Intelligence (AI) and Machine Learning – the use of AI and machine learning in business management is expected to grow. AI can assist in decision-making and automate a greater number of processes. This can lead to improved decision quality and reduced management costs.
- Data Analytics – the future will likely see continued growth in the use of data analytics in business management. Data analytics enables the collection, processing, and analysis of large volumes of information, providing valuable insights to support decision-making processes. This is useful for businesses across various sectors, such as financial organizations, logistics companies, or manufacturing enterprises.

Data analytics helps businesses identify trends and patterns, generate forecasts, monitor operations, and make timely decisions based on data. It also aids in improving production processes and resource efficiency. The number of businesses using intelligent data analysis to optimize operations and increase profitability is expected to rise. The development of AI, machine learning, and other data-processing technologies will further enhance the effectiveness of data use.

Businesses are forecasted to increasingly leverage digital tools for operational optimization and efficiency enhancement. New opportunities are emerging with the use of IoT, cloud technologies, data analytics, and AI. Companies that actively adopt these technologies will be able to boost their competitiveness, reduce costs, and improve the quality of their products or services.

Furthermore, the development of digital technologies is expected to open new opportunities for businesses in the fields of marketing and sales. For instance, advertising on social media and the use of e-commerce platforms will become even more popular and effective.

Given the rapid technological advancements, it can be asserted that significant changes will occur in business management approaches in the future. Digitalization will be one of the key trends in management, enabling businesses to become more competitive and successful in the market. However, at present, for successful implementation of digital tools, businesses must make significant efforts in training staff, implementing appropriate programs and technologies, and building the necessary infrastructure.

Special attention should be given to AI, or Artificial Intelligence. This field of computer science focuses on creating programs and systems capable of performing tasks that typically require human intelligence. These tasks include speech recognition, text understanding, solving complex problems, image recognition, product development, writing academic papers, and much more[8].

The core idea behind using artificial intelligence is to make computer systems smarter and more flexible, as well as to reduce dependence on human specialists and manual labor.

Some examples of AI applications include:

- Production and Process Automation – the use of machine learning algorithms and neural networks helps reduce manual labor and increase production efficiency.
- Image Recognition and Processing – computer vision algorithms can recognize faces, vehicles, animals, and other objects in images.
- Smart Home Devices – voice assistants, such as Siri and Alexa, use AI to understand requests and perform tasks.
- Financial Analysis and Forecasting – machine learning algorithms can be used to analyze financial data and predict market trends.
- Medicine and Diagnostics – machine learning algorithms can assist in detecting diseases and determining optimal treatments.
- Recommendations and Personalized Marketing – machine learning algorithms can analyze user behavior and recommend relevant products and services, enhancing the effectiveness of marketing campaigns.
- Self-Driving Cars – automatic vehicle control based on artificial intelligence helps reduce accident rates and ensure road safety.

[8] Y. Kyrylov, N. Tanklevska, G. Zhosan,Viral management as a subset of creative management in conditions of financial instability, "IRCPNU" 2018; 2(14): 160-164.

- E-Commerce and Text Recognition – machine learning algorithms can be used for automatic text recognition and language translation, facilitating electronic communication and ensuring faster and more efficient work online.
- Business Management Assistants – machine learning algorithms can be utilized to analyze large volumes of data and make decisions in business management.

According to a survey of 7,502 companies worldwide conducted by Morning Consult for IBM from March 30 to April 12, 2022, the global share of companies implementing artificial intelligence is currently 35%, up 4 percentage points from 2021. This was reported by DigiTimes Asia. China and India have the highest AI deployment rates at 58% and 57%, respectively, while Canada stands at 28%, the UK at 26%, the US at 25%, and South Korea at 22%. Among the surveyed companies, 28% have a comprehensive AI strategy, 25% focus only on limited or specific use cases, and 37% are developing an AI strategy[9].

From the perspective of cloud computing, 43% of the surveyed companies use private clouds, 32% use hybrid or multiple clouds, 13% use public clouds, and 8% use on-premises servers.

Conclusions regarding potential directions for implementing digital tools in the activities of businesses in the Kherson region indicate significant potential and benefits that can be gained from this process.

First and foremost, one potential direction is the implementation of e-commerce platforms and online trading. This will allow businesses in the Kherson region to expand their audience and attract new customers regardless of their location. E-commerce will enhance the accessibility of products and services and provide a convenient system for ordering and payment[10].

Another potential direction is the implementation of electronic document management systems and business process automation. This will allow businesses to reduce the time and costs associated with document processing, simplify reporting and control processes, and improve communication within the organization and with partners.

A third potential direction is the use of analytical tools and artificial intelligence for data analysis and decision-making. Implementing such tools will enable businesses in the Kherson region to gain valuable insights from large volumes of data, forecast trends, and identify new opportunities for development[11].

Additionally, the adoption of digital tools can enhance customer interaction, for example, through the use of mobile applications or virtual assistants. This will allow businesses to create personalized services and facilitate communication with customers, positively impacting their satisfaction and loyalty.

---

[9] D. M. Mazzone, Digital or Death: Digital Transformation – The Only Choice for Business to Survive Smash and Conquer, Smashbox Consulting Inc., Mississauga, Ontario 2014.

[10] T. Ochs, U. A. Riemann, IT Strategy Follows Digitalization. Encyclopedia of Information Science and Technology, IGI Global, Hershey 2018.

[11] D. Shalmo, C. A. Williams, L. Boardman, Digital ttansformation of bussines models – best practice, enablers and roadmap, "International Journal of Innovation Management" 2017; 21(08): 1-17.

In summary, potential directions for implementing digital tools in the activities of businesses in the Kherson region include e-commerce, electronic document management systems, the use of analytical tools, and improved customer interaction. These directions can help businesses achieve increased efficiency, enhanced competitiveness, and sustainable development in the modern digital world.

Bibliography

BCG, Featured insights and perspectives from BCG. Online: https://www.bcg.com/ru-ru/featured-insights/thought-leadership-ideas.

Bedianashvili G., Zhosan H., Lavrenko S., Modern digitalization trends of Georgia and Ukraine, "Management, Economic Engineering in Agriculture and Rural Development" 2022; 22(3): 57-74.

BMWi, Industrie 4.0 und Digitale Wirtschaft – Impulse für Wachstum, Beschäftigung und Innovation, Bundesministerium für Wirtschaft und Energie, Berlin 2015.

Boueé C., Schaible S., Die Digitale Transformation der Industrie. Studie: Roland Berger und BDI. Online: https://www.researchgate.net/publication/315857925_Die_digitale_Transformation_von _Geschaftsmodellen_gestalten.

Bouwman H., Nikou S., Molina-Castillo F. J., Mark de Reuver. The impact of digitalization on business models, "Digital Policy, Regulation and Governance" 2018; 20(2): 105-124.

Brennen S., Digitalization and Digitization. Online: http://culturedigitally.org. Harnessing the Digital Economy for Developing Countries.

Digital Vortex, How Digital Disruption Is Redefining Industries. Online: https://www.cisco.com/c/dam/en/us/solutions/collateral/industry-solutions/digital- vortex--report.pdf.

Kyrylov Y., Tanklevska N., Zhosan G.,Viral management as a subset of creative management in conditions of financial instability, "IRCPNU" 2018; 2(14): 160-164.

Mazzone D. M., Digital or Death: Digital Transformation – The Only Choice for Business to Survive Smash and Conquer, Smashbox Consulting Inc., Mississauga, Ontario 2014.

Ochs T., Riemann U. A., IT Strategy Follows Digitalization. Encyclopedia of Information Science and Technology, IGI Global, Hershey 2018.

Shalmo D., Williams C. A., Boardman L., Digital ttansformation of bussines models – best practice, enablers and roadmap, "International Journal of Innovation Management" 2017; 21(08): 1-17.

*Janusz Gudowski**
*Tomasz Wołowiec***
*Joe-Ikechebelu Etal****
*Robert Szarota*****
*Tatiana Varcholova******
*Stanisława Podkowińska*******

STATISTICAL AND ECONOMETRIC DATA – VERIFICATION AND MANAGEMENT IN ECONOMICS, FINANCE AND TRANSPORT & LOGISTIC MANAGEMENT

Dane statystyczne i ekonometryczne – weryfikacja i zarządzanie w ekonomii, finansach oraz zarządzaniu transportem i logistyką

*Prof., WSEI University in Lublin, ORCID: 0000-0001-1211-0683
**PhD., DsC. Assoc. Prof., WSEI University in Lublin, ORCID: 0000-0002-7688-4231
***Prof., Chukwuemeka Odumegwu Ojukwu University in Nigeria, ORCID: 0000-0002-1843-2050
****MA, School of Business – National-Louis University in Nowy Sącz (WSB-NLU), ORCID: 0009-0000-3814-4526
*****Prof., University of Central Europe, Slovakia, ORCID: 0000-0001-1244-0009
******WSEI University in Lublin, student

Streszczenie

Współczesne społeczeństwo określane jest mianem „społeczeństwa informacyjnego". Oznacza to, że obecnie informacje i dane, wiedza i sposoby ich przekazywania stały się jednymi z najcenniejszych i niezbędnych elementów funkcjonowania dzisiejszego świata. We współczesnym społeczeństwie i gospodarce dane (informacje) tworzą ze sobą rozległe i gęste sieci, stanowiąc de facto jego podstawę. Ogromny wzrost znaczenia odpowiedniej selekcji i zarządzania danymi wynika z modelu współczesnej gospodarki, która ma charakter kapitałochłonny. Oznacza to, że zwiększenie produktywności w każdej dziedzinie zależy od inwestycji kapitałowych, które obecnie polegają głównie na wdrażaniu nowych technologii. To, w połączeniu z nieustającą konkurencją na rynku, prowadzi do znacznego wzrostu zapotrzebowania na nowe metody produkcji, które są przecież niczym innym jak właśnie informacjami (danymi). Dlatego też firmy koncentrują się obecnie przede wszystkim na poszukiwaniu „know-how", które jest istotnym elementem rentowności przedsiębiorstwa. Konieczne stało się zatem ciągłe wprowadzanie innowacji, gdyż ich brak może zachwiać fundamentami najpotężniejszych światowych korporacji.

Słowa kluczowe: *zarządzanie danymi, racjonalność ekonomiczna, dane finansowe, nowe technologie, rentowność, modelowanie ekonometryczne*

Summary

Modern society is termed "information society". This means that nowadays information and data, knowledge and ways of transmitting them have become some of the most valuable and necessary elements in the functioning of today's world. In today's society and economy, data (information) form extensive and dense networks with each other, constituting its de facto basis. The huge increase in the importance of appropriate selection and management of data is due to the model of the modern economy, which is capital-intensive in nature. This means that increasing productivity in any field depends on capital investment, which now consists mainly of implementing new technologies. This, combined with the ever-unrelenting competition in the market, leads to a significant increase in demand for new production methods, which are, after all, nothing but information (data) precisely. Therefore, companies are now focusing primarily on the search for "know-how", which is an important element of the company's profitability. It has therefore become necessary to constantly innovate, as failure to do so can shake the foundations of the world's most powerful corporations.

Key words: data management, economic rationality, financial data, new technologies, cost-effectiveness, econometric modelling

Introduction

Data is a specific collection of numbers or text, which can take various forms. Data is any collection that can be collected, presented, or processed. As for processing, it can be computer-based, system-based, or even thought-based. Thus, we do not always need a device to process data, because it can be processed mentally. Data can determine the characteristics of an object, thing, phenomenon.

The forms and forms in which data can appear are various, data can be expressed, among other things, through:

- signs,
- illustrations,
- film recordings,
- sound recordings,
- symbols,
- diagrams,
- speech,
- signals.

We can refer to sets of numbers, or words, as data. However, if we don't know what they represent and what they indicate, we can't call them data, just ordinary

information. That is, it is important that the data have a specific purpose of usefulness. Thematic collections and compilations of information on a given topic are referred to as datasets. We can store data sets in a permanent form through the process of data archiving. Data archiving involves transferring a specific set of data to a storage location for storage purposes. Data archiving also allows data to be reused as required. Data archiving is most often carried out using technological devices, such as a computer. A popular form of data archiving that is practically used by everyone, for example, is email archiving. Data is useful in many areas of life and science. For example, they have applications in mathematics and physics, where, for example, known and unknown values are defined by data.In everyday speech, that is, in everyday life, we define data as ordinary information (messages), thanks to which we can start, for example, the process of inference or logical thinking. We often subject data to a certain segregation, according to the relevant categories. Hence we associate data with tables or sheets. Proper arrangement of data facilitates at least the processing of data[1,2].

In a world of widespread computerization and highly developed technologies, data is associated with computers that need it for purposes such as computing. Data can be very impressive, even huge, and used in use even if only over the Internet. When processing important and data over the Internet, it is important to use appropriate systems to protect against the outflow of data, so that the law or the interests of the company in question are not violated.

The following are examples of data types:

- alphanumeric data,
- open data,
- public data,
- so-called Big Data,
- textual data,
- ordinary personal data,
- sensitive personal data,
- binary data,
- statistical data,
- input data,
- output data,
- text data,
- and others.

We deal with data in our daily lives. Often we don't even realize it (widespread computerization, or even in the form of our thought processes). Data is a set and structure of tags, which are described in a value that can be understood by specific audiences. Arranged and properly processed, they facilitate work and show, for example, the

[1] E. Gorczyca, Informacja naukowa z elementami naukoznawstwa, Wydawnictwo Szkolne i Pedagogiczne, Warszawa 1991.

[2] U. Kłosiewicz-Górecka, Źródła informacji i rodzaje potrzeb informacyjnych przedsiębiorstwa oraz przydatność informacji w zarządzaniu firmą, „Marketing i Rynek" 2015; 4: 9-15.

scale of a phenomenon. Data management is an administrative process that involves acquiring, validating, storing, protecting and processing the required data to ensure that information is available, reliable and timely for users. Organizations and enterprises have quite recently been using massive amounts of data to make business decisions and gain deep insights into customer behavior, trends and opportunities to create exceptional customer experiences.

To add up the vast amount of knowledge that businesses collect, analyze and store today, companies are looking into data management solutions and platforms. Data management solutions make processing, validation and other essential functions simpler and less time-consuming.

Leading data management platforms allow companies to leverage Big Data from all data sources, in real time, to more easily engage with customers and increase customer lifetime value (CLV). Data management software is important because we are creating and consuming data at an unprecedented rate. The best data management platforms give companies and organizations a 360-degree view of their customers, and thus the full visibility needed to gain the deep, critical insights into consumer behavior that give brands a competitive advantage.

While some companies are good at collecting data, they don't manage it tolerably well to make sense of it. Simply collecting data is not enough; companies and organizations must understand from the outset that data management and analysis will only be effective if they first think about how they gain value from their data. They will then go beyond data collection with effective systems for processing, storing and validating data, including as effective analytical strategies. Another knowledge management challenge arises when companies categorize data and organize it without first considering the answers they hope to get from the information. Each stage of knowledge collection and management must lead to the acquisition of relevant data and its analysis to extract the useful information needed to make data-driven business decisions[3,4].

The best thing to do through data management, and ultimately get the insights needed to make data-driven decisions, are to start with a business question and get the information needed to answer that question. Companies need to gather massive amounts of data from a variety of sources, and then use best practices when reviewing methods for storing and managing information, cleaning and extracting information, and then analyzing and visualizing the information to inform their business decisions. It's important to remember that data management best practices end with better analytics. By properly managing and preparing information for analysis, companies optimize their Big Data. Several organizations and businesses should strive to implement several data management best practices. It is with the help of knowledge management platforms that organizations are empowered to collect, sort and store

[3] W. Flakiewicz, Systemy informacyjne w zarządzaniu. Uwarunkowania, technologie, rodzaje, C.H. Beck, Warszawa 2002.

[4] K. Woźniak, System informacji menedżerskiej jako instrument zarządzania strategicznego w firmie, Akademia Ekonomiczna w Krakowie, Kraków 2005.

their information, and then repackage it in a visualized way in which it is useful to marketers. The best performing data management platforms are able to manage all information from all data sources in a central location, giving marketers and executives the most accurate business and customer information available. A data management platformData management is an initiative to handle the vast amount of knowledge, both structured and unstructured, that floods businesses every day. Only with the best data management practices are organizations ready to leverage their data and get the information they need to create actionable insights.

The need for seasonal adjustment of time series in the context of data reliability

A time series is a sequence of observations showing the development of the examined phenomenon in subsequent periods (days, months, quarters, years, etc.). In the time series, it is possible to distinguish several components resulting from the influence of various factors on a given phenomenon. The following time series components are distinguished[5]:

1. A development tendency, called a trend, expresses a long-term tendency to unidirectional changes (increase or decrease) in the value of the variable under study. It is considered as a consequence of a fixed set of factors.
2. Cyclical fluctuations (cyclical component) are expressed in the form of long-term, rhythmic fluctuations of the value of the series around the development trend. They are usually associated with the business cycle of the economy.
3. Seasonal fluctuations (seasonal component) are fluctuations in the value of a series around its development trend with a period not exceeding one year. They represent effects that repeat with a certain regularity, every year in the same periods. They usually reflect the influence of the weather (related mainly to the succession of the seasons) or the calendar.
4. The residual part, i.e. not subject to explanation (not attributable to the listed sources of variability), is called a random (non-systematic) component. It contains random fluctuations of the series around the systematic part, which are difficult to identify a priori.

The components listed in points 1 to 3 are referred to as systematic, as they form a systematic part of the series, i.e. they can be explained. In addition, within the systematic part of the series, calendar effects can be distinguished, which are not purely seasonal. The effects resulting from the influence of the calendar may reflect: differences between the length (number of days) of individual periods – 28, 29, 30, 31 days for months, 90, 91, 92, 93 for quarters, differences between the number of different days of the week in a period, structure of days holidays, taking into account movable holidays and national holidays, etc. They can be repeatable from year to year (e.g. the

[5] G. G. Judge, W. E. Griffith, R. C. Hill, H. Luetkepohl, T. S. Lee, The theory and practice of econometrics, Wiley and Sons, New York 1985.

number of days in a month – except for February, the occurrence of fixed holidays) or specific for each year (e.g. the arrangement of days of the week, the occurrence of movable holidays). Recurring effects are an integral part of the seasonal component. Other calendar effects are usually not included in the seasonal component, but they are treated in a similar way from the point of view of seasonal adjustments (i.e. removed from the adjusted series) and can be treated as a separate, specific component of the systematic part of the series. Their analysis and elimination from the adjusted series is performed at a separate stage of the seasonal adjustment procedures, the so-called working day alignment. The components of the time series may be connected by a relationship: additive, multiplicative and additive-multiplicative.

In the case of additive seasonality, we are dealing with seasonal effects consisting in underestimating or overestimating the value of a phenomenon in periods of the same type, e.g. in all January, or e.g. in the second quarter of each year, by an approximately constant value throughout the observation period. In the case of multiplicative seasonality, the seasonal effects are approximately constant in percentage terms, i.e. the higher the values of the phenomenon, the higher the seasonal fluctuations. The additive indicator is added to the trend value, the multiplicative indicator is multiplied.

The occurrence of a seasonal component in a time series leads to problems with interpreting changes in the phenomenon from period to period. In order to properly analyze current trends in short-term indicators, it is necessary to eliminate seasonal influences, otherwise it is only legitimate to compare them for periods of the same name (e.g. January 2004 to January 2003) and only within a given country.

Seasonal adjustment of a time series consists in removing the seasonal component from the series (a balanced series is a combination of all components, except for the seasonal component). In order to perform this operation, in the case of most seasonal adjustment methods, it is necessary to extract all components, i.e. perform decomposition.

The seasonal adjustment procedure can be divided into two stages. The first is referred to as pre-adjustment, the second is the actual decomposition and elimination of seasonal effects.

During the initial alignment procedure, the following steps are usually performed[6,7,8]:

- determining the nature of the relationship between the components (whether it is additive or multiplicative), e.g. by testing the need for an initial logarithmic transformation,
- detection of outliers (unusual disturbances) occurring in a series,
- equalization by working days,

[6] Compare: S. S. Maiti, B. N. Mukherjee, A note on the distributional properties of the Jöreskog-Sörbom fit indices, "Psychometrika" 1990; 55: 721-726.

[7] S. G. Makridakis, Forecasting, planning, and strategy for the 21st century, Free Press, London 1990.

[8] D. F. Morrison, Multivariate statistical methods, McGraw-Hill, New York 1990.

– initial model identification,
– determination of the projected values of the series beyond the observation period ("extension" of the series at its ends), if it is necessary from the point of view of the applied equalization method.

The occurrence of unusual disturbances in the series, which are the result of sporadic, irregular events, causes – if they are not identified and properly treated – distortions in the series analysis and makes modeling them difficult or even impossible. Therefore, special algorithms are used to detect such disturbances and then eliminate their impact by appropriately including in the model, correcting or excluding observations from the analysis. The equalization procedures used distinguish the following types of disorders by testing for their presence and treating them accordingly:
– single outlier observations (AO), when the disturbance concerns a single observation, after which the series returns to the previous trajectory, e.g. strike, weather anomalies, registration errors;
– level change (LS), which occurs when a disturbance causes a change in the value of a phenomenon, which persists in subsequent periods, i.e. the phenomenon continues to develop at a changed level, its trajectory is shifted – e.g. changes in nomenclature, changes in definitions;
– transient change (TC), when the perturbation effect gradually wears off and the series returns to its previous trajectory, but it takes several consecutive periods.

In order to implement the working-day adjustment, various regressor variants are tested: for individual days of the week, their combinations, the leap year effect and the Easter effect. For the system of regressors considered optimal, the effects of working days are estimated and eliminated from the series. The output of the initial adjustments is a series "cleaned" of the effects analyzed at this stage, devoid of "disturbances" that hinder the actual analysis of seasonality. It is carried out in the second stage of the equalization procedure and includes[9,10]:
– decomposition of the series into components,
– assignment of regression effects to individual components,
– proper seasonal adjustment, consisting in removing the seasonal component from the series,
– diagnostics of the model, the obtained series decomposition and alignment.

All activities carried out during both main stages of the procedure are highly parameterized, i.e. they depend on the choice of the alignment method, its variant and the determination of the values of many parameters. These choices can be made by a built-in algorithm in an automatic procedure (based on statistical criteria) or by an analyst performing the alignment process in an interactive mode. Complete elimination of the influence of the analyst's decision on the adjustment process is not possible, because even in the automatic mode it is necessary to at least set the threshold

[9] See more: R. Scheines, Causation, indistinguishability, and regression, [in:] SoftStat '93. Advances in statistical software 4, F. Faulbaum (ed.), Gustav Fischer Verlag, Stuttgart 1994.

[10] S. S. Schiffman, M. L. Reynolds, F. W. Young, Introduction to multidimensional scaling: Theory, methods, and applications, Academic Press, New York 1981.

values for statistical criteria, and the use of the interactive mode is often beneficial for the quality of adjustments.

The identification of the model is of particular importance for the course of the alignment procedure and the quality of the obtained results. The model should describe the studied reality as best as possible and be validated by appropriate statistical tests available to the analyst in the adjustment procedures. Taking into account the postulate of stability, it is also advisable to avoid frequent model changes.

In practice, two commonly used seasonal adjustment procedures are[11]:

1. X12-ARIMA is a development of the X11-ARIMA and X11-ARIMA/88 systems. Decomposition, i.e. separation of components (trend, cyclical component, seasonal component, residual component) is carried out by using an appropriate algorithm based on the use of moving average filters, often referred to as X-11 filters. Although the name of the procedure uses the term ARIMA (Autoregressive Integrated Moving Average), the model is only used to estimate regression coefficients and extend the series to obtain the theoretical values needed to calculate moving averages at the ends of the series.
2. Tramo/Seats method (TRAMO – Time series Regression with ARIMA noise, Missing observations, and Outliers/SEATS – Signal Extraction in ARIMA Time Series). Tramo/Seats is a method strictly based on the ARIMA methodology, using it not only as an auxiliary tool for forecasting and smoothing the series, but also as a basic tool for proper decomposition (separation of components).
3. Both procedures for seasonal adjustment of time series are recommended by Eurostat. The Central Statistical Office uses the Tramo/Seats method for seasonal adjustments of published time series[12].

Multi-equation models in the process of creating reliable data

As in single-equation models, we have explanatory and explanatory variables. In a single equation, we have one explanatory variable. We usually write it on the left side of the equation. On the other hand, on its right side there are variables explaining the development of the dependent variable. In multi-equation models, the variables are divided into endogenous variables and exogenous variables. The variables explained by the model are called endogenous variables, while exogenous variables are those whose values are determined outside the model, and a variable corresponding to the constant is attached to them.

[11] Statistica PRO website.

[12] Selected websites with information on seasonal adjustment of time series: Eurostat. Online: http://www.forum.europa.eu.int/Public/irc/dsis/eurosam/home; OECD. Online: http://stats.oecd.org/glossary/detail.asp?ID=2398; European Central Bank. Online: http://www.ecb.int/pub/pdf/other/statseasonadjustmenten.pdf; Bank of Spain. Online: http://www.bde.es/servicio/software/econome.htm; U.S. Census Bureau. Online: http://www.census.gov/srd/www/x12a/; Statistics Denmark. Online: http://www.dst.dk/upload/seasonal.pdf.

The next criterion for the classification of variables concerns the situation when we have a multi-equation dynamic model, where there are variables from different periods. Endogenous and exogenous variables can be time-lag and non-time-lag. Non-lagging variables refer to the current periods and lagging variables refer to earlier periods.

Endogenous non-lagged variables are usually called concurrent variables. Time-lagged endogenous variables and lagged and non-lagged exogenous variables are referred to as predetermined variables. This division is important from the point of view of estimating model parameters.

Structural and reduced form of the model. The individual equations of the model determine the relationships between the variables. The multi-equation model is therefore a description of the structure of the relationship system. Therefore, in the econometric literature, such a record of a multi-equation model that shows the real relationships between variables is called the structural form of the model. To formally define what we mean by this, let's denote:

- y_{it} – observation of the i-th endogenous variable in the period t, i = 1, 2, …, m;
- $With_{i.e}$ – observation of the jth variable predetermined in the period t, j = 1, 2, …, k;
- βil – parameter for the l-th non-lagged endogenous variable in the i-th equation, l, i = 1, 2, …., m;
- γij – parameter with the j-th variable predetermined in the i-th equation, i = 1, 2, …, m; j = 1, 2, …, k.

If we have a model consisting of equations:

$$y1t = \sum_{l=2}^{m} \beta 1lylt + \sum_{j=1}^{k} \gamma 1jzjt + \varepsilon 1t,$$

$$y2t = \sum_{l=1, l=2}^{m} \beta 2lylt + \sum_{j=1}^{k} \gamma 2jzjt + \varepsilon 2t,$$

$$ymt = \sum_{l=1}^{m-1} \beta mlylt + \sum_{j=1}^{k} \gamma mjzjt + \varepsilon mt,$$

This, by transferring all interdependent variables and predetermined variables to the left side of the equations, gives the structural form of the model:

$$y1t - \sum_{l=2}^{m} \beta 1lylt - \sum_{j=1}^{k} \gamma 1jzjt = \varepsilon 1t,$$

$$y2t - \sum_{l=1, l=2}^{m} \beta 2lylt - \sum_{j=1}^{k} \gamma 2jzjt = \varepsilon 2t,$$

$$ymt - \sum_{l=1}^{m-1} \beta mlylt - \sum_{j=1}^{k} \gamma mjzjt = \varepsilon mt,$$

Individual equations of the structural form of the model are called structural equations. We will present the structural form of the model using the matrix notation:

$BYt + \Gamma' Zt = \varepsilon t$, t = 1, 2, …, n.

Where:
B – matrix of parameters with non-lagged endogenous variables:

$$B=\begin{pmatrix} 1 & -\beta_{12} & \cdots & -\beta_{1m} \\ \beta_{21} & 1 & \cdots & -\beta_{2m} \\ \cdots & \cdots & \cdots & \cdots \\ \beta_{m1} & -\beta_{m2} & \cdots & 1 \end{pmatrix}$$

Γ′ – matrix of parameters with predetermined variables:

$$\Gamma'=\begin{pmatrix} -\gamma_{11} & -\gamma_{12} & \cdots & -\gamma_{1k} \\ -\gamma_{21} & -\gamma_{21} & \cdots & -\gamma_{2k} \\ \cdots & \cdots & \cdots & \cdots \\ -\gamma_{m1} & -\gamma_{m2} & \cdots & -\gamma_{mk} \end{pmatrix}$$

Yt – vector observations of non-lagged endogenous variables in period t:

$$Yt=\begin{pmatrix} y_{1t} \\ y_{2t} \\ \cdots \\ y_{mt} \end{pmatrix}$$

WITHt – vector of observations of predetermined variables in period t:

$$WITHt=\begin{pmatrix} z_{1t} \\ z_{2t} \\ \cdots \\ z_{mt} \end{pmatrix}$$

εt – vector of random components in period t:

$$\varepsilon t=\begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \cdots \\ \varepsilon_{mt} \end{pmatrix}$$

For the estimation of the parameters of some types of models, it is necessary to introduce the concept of the reduced form of the model. In the reduced form, the explanatory variables are only predetermined variables. In order to go from the structural form to the reduced form of the model, the parameter matrix for the jointly correlated variables B must be non-singular. Then there is an inverse matrix B^{-1}
Multiplying $BYt + \Gamma' Zt = \varepsilon t$ left-hand side by B^{-1}, we get:

$b^{-1}BYt + B^{-1}\Gamma' Zt = B^{-1}\varepsilon t$

$b^{-1}B = I$, so we can write the above relationship as:

$Yt = --B^{-1}\Gamma Zt + B^{-1}\varepsilon t$

Denoting $\Pi = --B^{-1}\Gamma$ and $\eta t = B^{-1}\varepsilon t$, we get the reduced form of the model:

$Yt = \Pi Zt + \eta t$

The elements of the matrix Π are denoted as πij, i =1, 2, …, m; j = 1, 2, …, k, so we have:

$y1t = \pi 11z1t + \pi 12z1t + \ldots + \pi 1kzkt + \eta 1t,$

$y1t = \pi 21z1t + \pi 22z2t + \ldots + \pi 2kzkt + \eta 2t,$

$y1t = \pi m1z1t + \pi m2zmt + \ldots + \pi mkzkt + \eta mt.$

In the reduced form of the model, non-lagged endogenous variables are explained by fixed variables.

Classification of multi-equation models. Due to the relationships between non-time-lagged endogenous variables, multi-equation models are divided into simple models, recursive models and models with interdependent equations. The classification of multi-equation models is carried out on the basis of a matrix of structural parameters with non-lagged endogenous variables. Therefore, a matrix B of the structural form $BYt + \Gamma Zt = \varepsilon t$ is considered.

The model is a simple model if B is an identity matrix:

$$B=\begin{pmatrix} 1 & 0 & \cdots & 0 \\ 0 & 1 & \cdots & 0 \\ \cdots & \cdots & \cdots & \cdots \\ 0 & 0 & \cdots & 1 \end{pmatrix}$$

recursive model, if B is a triangular matrix:

$$B=\begin{pmatrix} 1 & 0 & \cdots & 0 \\ \beta_{21} & 1 & \cdots & 0 \\ \cdots & \cdots & \cdots & \cdots \\ \beta_{m1} & -\beta_{m2} & \cdots & 1 \end{pmatrix}$$

or can be reduced to a triangular matrix after appropriate renumbering of endogenous variables, and a model with interdependent equations, if it is not a simple or recursive model. In the simple model, no non-lagging endogenous variable is used as an explanatory variable in any equation.

Identification problem. Based on the previously presented way of transition from the structural form to the reduced form of the model, we conclude that if the matrix B is non-singular, then the matrix Π can always be determined from the formula $\Pi = --B\,\Gamma$. The reverse is much more difficult. It consists in solving the system of equations $B\Pi = --\Gamma$, i.e. determining the elements of the matrix B and Γ. In the general case, the matrix B has m^2-m, and the matrix Γ has m*k unknown elements, and there are m equations. Therefore, it is not always possible to determine the parameters of the structural form on the basis of the parameters of the reduced form of the model. This problem is called the identification problem.

A model is identifiable if all parameters of the structural form can be determined from the parameters of the reduced form. In addition to the identifiability of the entire model, we will consider the identifiability of its individual structural equations. A given structural equation is identifiable if all parameters can be determined from the reduced form. Of course, the model is traceable when each structural equation is traceable.

Three situations can occur in the identification problem[13,14,15]:

1. It is not possible to determine all the parameters of the structural equation based on the knowledge of the parameters of the reduced form of the model. The equation is then unidentifiable.
2. Based on the knowledge of the parameters of the reduced form of the model, the parameters of the structural equation can be clearly determined. The equation is then called uniquely identifiable.
3. If the parameters of the structural equation can be determined on the basis of the parameters of the reduced form in an ambiguous way, then we are talking about an ambiguously identifiable equation.

The identification problem boils down to determining whether the system of equations BΠ = Γ́ has a solution. This arrangement can be written as:

$$\begin{pmatrix} 1 & -\beta_{12} & \cdots & -\beta_{1m} \\ \beta_{21} & 1 & \cdots & -\beta_{2m} \\ \cdots & \cdots & \cdots & \cdots \\ \beta_{m1} & -\beta_{m2} & \cdots & 1 \end{pmatrix} \begin{pmatrix} -\prod_{11} & -\prod_{12} & \cdots & -\prod_{1k} \\ -\prod_{21} & -\prod_{21} & \cdots & -\prod_{2k} \\ \cdots & \cdots & \cdots & \cdots \\ -\prod_{m1} & -\prod_{m2} & \cdots & -\prod_{mk} \end{pmatrix} = \begin{pmatrix} -\gamma_{11} & -\gamma_{12} & \cdots & -\gamma_{1k} \\ -\gamma_{21} & -\gamma_{21} & \cdots & -\gamma_{2k} \\ \cdots & \cdots & \cdots & \cdots \\ -\gamma_{m1} & -\gamma_{m2} & \cdots & -\gamma_{mk} \end{pmatrix}$$

Let's consider ith row matrix Γ́. Notations: m1-number of non-lagged endogenous variables in the i-th equation of the structural form of the model, excluding yit; m2-number of other Endogenous variables present in the model; k1-number of predetermined variables appearing in the examined equation; k2-number of other predetermined variables present in the model. Thus, we have the relations: 1 + m1 + m2 = m and k1 + k2 = k, where m is the number of all non-lagged endogenous variables and k is the number of all predetermined variables present in the model.

In order to be able to determine the parameters in the i-th equation of the structural form of the model, the individual elements of the i-th row of the matrix B Π must be equal to the individual elements of the i-th row of the Γ́ matrix. We have Sok equations, because all elements of the i-th row of matrix Γ́ are k and m1+k1 unknowns, because in the i-th structural equation there are m1 unknown elements of the i-th row of matrix B and k1 unknown elements of the i-th row of matrix B and k1 unknown elements of the ith row of matrix B and k1 unknown elements of the ith row of Γ́.

[13] See: F. L. Schmidt, J. E. Hunter, Eight common but false objections to the discontinuation of significance testing in the analysis of research data, [in:] What if there were no significance tests, L. L. Harlow, S. A. Mulaik, J. H. Steiger (ed.), Lawrence Erlbaum Associates, New York 1997.

[14] A. J. Shepherd, Second-Order Methods for Neural Networks, Springer, New York 1997.

[15] D. F. Speckt, Probabilistic Neural Networks, "Neural Networks" 1990; 3(1): 109-118.

To determine the solution, the number of equations should be greater than or equal to the number of unknowns: $k \leq k1 + k2$. Thus, taking into account the relation $k = k1 + k2$, we have obtained with the required condition $k2 \geq m1$.

The obtained result is known in the econometric literature as the dimension condition. It can be formulated as follows:

- A necessary condition for the identifiability of a given structural equation is that the number of predetermined variables in the model that are not present in this equation is greater than or equal to the number of non-lagged endogenous variables in this equation minus one.
- Adding m2 to both sides of the inequality $k2 \geq m1$ gives $m2 + k2 \geq m-1$.
- The dimension conclusion can be formulated in the equivalent form:
- A necessary condition for the identifiability of a given structural equation is that the number of variables (together interdependent and predetermined) not present in this equation is greater than or equal to the total number of non-lagged endogenous variables minus one.
- In case $k2 = m$, the equation can be uniquely identified, while if $k2 > m1$, it is ambiguously identifiable.

The dimension condition is a necessary but not sufficient condition. For the structural equation of the model to be traceable, the dimension condition must be met. However, it may happen that even though the dimension condition is met, the equation is not identifiable. In the literature, the necessary and sufficient condition of traceability is called the order condition. This condition requires examining the order of the corresponding submatrix Π. A necessary and sufficient condition can be formulated as a necessary and sufficient condition for the i-th equation of a model consisting of m equations to be identifiable is that the matrix formed from the parameters of the variables that are present in the model but not in the i-th equation is of order m - 1.

Indirect method of least squares

The indirect method of least squares is applicable to the estimation of parameters of models with uniquely identifiable interdependent equations. The idea is to use the evaluations of the parameters of the reduced form to obtain the evaluations of the parameters of the structural form. Procedure: the indirect method of greatest squares is as follows:

1. We reduce the model to the reduced form:
   $Y = \Pi Z + \eta$
2. We estimate the parameters of the reduced form using the classic method of least squares using the following formula:
   $P = (Z^{T}WITH)^{-1}WITH^{T}Y$

Where:

$$P^T=\begin{pmatrix} p_{11} & p_{12} & \cdots & p_{1k} \\ p_{21} & p_{22} & \cdots & p_{2k} \\ \cdots & \cdots & \cdots & \cdots \\ p_{n1} & p_{n2} & \cdots & p_{nk} \end{pmatrix}$$

evaluation of the Π matrix of reduced form parameters

$$WITH=\begin{pmatrix} z_{11} & z_{12} & \cdots & z_{1k} \\ z_{21} & z_{22} & \cdots & z_{2k} \\ \cdots & \cdots & \cdots & \cdots \\ z_{n1} & z_{n2} & \cdots & z_{nk} \end{pmatrix}$$

matrix of observations of fixed variables occurring in the model

$$Y=\begin{pmatrix} y_{11} & y_{12} & \cdots & y_{1m} \\ y_{21} & y_{22} & \cdots & y_{2m} \\ \cdots & \cdots & \cdots & \cdots \\ y_{n1} & y_{n2} & \cdots & y_{nm} \end{pmatrix}$$

matrix of observations of jointly interdependent variables occurring in the model.

3. Estimates of structural form parameters are obtained by solving a system of equations

$BP^T = - Γ$

EXAMPLE 1. We will consider a model describing the relationship between the value of fixed assets in PLN million (K), employment in thousands and People (Z), investment outlays in PLN million (I) and production in thous. Pieces (P) of the form:

$K = \beta_{12}Z + \gamma_{11}I + \gamma_{13}X + \varepsilon_1$

$Z = \beta_{21}K + \gamma_{22}P + \gamma_{23}X + \varepsilon_2$

In this model, X is a variable taking values equal to unity.

The observations of the individual variables in seven consecutive years are given in the table below:

t	k_t	$With_t$	and_t	p_t	x_t
1	60	3.4	1.1	22	1
2	62	3.5	1.5	24	1
3	65	3.7	1.4	25	1
4	66	3.7	1.7	28	1
5	68	3.9	1.7	29	1
6	69	4.1	1.9	33	1
7	72	4.1	1.6	32	1

The reduced form of the estimated model is as follows:

$K = p_{11}I + p_{12}P + P_{13}X + \eta_1$

$Z = p_{21}I + p_{22}P + P_{23}X + \eta_2$

First, we estimate the parameters of the reduced form using the classical least squares method for both equations simultaneously. The matrix of observations of model interdependent variables and the matrix of observations of predetermined variables are as follows:

$$Y = \begin{pmatrix} 60 & 3,4 \\ 62 & 3,5 \\ 65 & 3,7 \\ 66 & 3,7 \\ 68 & 3,9 \\ 69 & 4,1 \\ 72 & 4,1 \end{pmatrix} \quad Z = \begin{pmatrix} 1,1 & 22 & 1 \\ 1,5 & 24 & 1 \\ 1,4 & 25 & 1 \\ 1,7 & 28 & 1 \\ 1,7 & 29 & 1 \\ 1,9 & 33 & 1 \\ 1,6 & 32 & 1 \end{pmatrix}$$

Performing subsequent calculations according to the formula $P = (Z^T WITH)^{-1} WITH^T Y$ we get:

$$WITH^T Z = \begin{pmatrix} 17,37 & 306 & 10,9 \\ 306 & 5423 & 193 \\ 10,9 & 193 & 7 \end{pmatrix}$$

$$(WITH^T WITH)^{-1} = \frac{1}{73,18} \begin{pmatrix} 712 & -38,30 & -52,70 \\ -38,3 & 2,78 & -17,01 \\ -52,7 & -17,01 & 561,51 \end{pmatrix}$$

$$WITH^T Y = \begin{pmatrix} 724,1 & 41,44 \\ 12834 & 734,50 \\ 462 & 26,40 \end{pmatrix}$$

$$P = \begin{pmatrix} -4,5122 & -0,2371 \\ 1,1871 & 0,0778 \\ 40,3281 & 1,9969 \end{pmatrix}$$

P matrix^{T}the values of the parameters of the reduced form of the estimated model are as follows:

$$P^T = \begin{pmatrix} -4,5122 & 1,1871 & 40,3281 \\ -0,2371 & 0,0778 & 1,9969 \end{pmatrix}$$

Hence, the model reduced after estimation has the following form:

The parameter matrix B for endogenous variables without time lags K and Z and the parameter matrix Γ for predetermined variables I, P and X in structured form are as follows:

$$B=\begin{pmatrix} 1 & -\beta_{12} \\ -\beta_{21} & 1 \end{pmatrix} \quad \Gamma=\begin{pmatrix} -\gamma_{11} & 0 & -\gamma_{13} \\ 0 & -\gamma_{22} & -\gamma_{23} \end{pmatrix}$$

Therefore, the system of equations $BP^T = -\Gamma$ takes the form:

$$\begin{pmatrix} 1 & -\beta_{12} \\ -\beta_{21} & 1 \end{pmatrix} \begin{pmatrix} -4,5122 & 1,1871 & 40,3281 \\ -0,2371 & 0,0778 & 1,9969 \end{pmatrix} = \begin{pmatrix} -\gamma_{11} & 0 & -\gamma_{13} \\ 0 & -\gamma_{22} & -\gamma_{23} \end{pmatrix}$$

After performing the appropriate operations on the matrices, we obtain the following systems of equations:

$-4.5122 + 0.2371\beta_{12} = \gamma_{11}$
$1.1871 - 0.0778\beta_{12} = 0$
$40.3281 - 1.9969\beta_{12} = \gamma_{13}$

and

$4.5122\beta_{21} + N0.2371 = 0$
$-1.1871\beta_{21} + 0.0778 = \gamma_{22}$
$-40.328\beta_{21} + 1.9969 = \gamma_{23}$

From the first equation we get:
$\beta_{12} = 15.2584$ $\gamma_{11} = -0.8944$ $\gamma_{13} = 9.8586$

From the second:
$\beta_{21} = 0.0525$ $\gamma_{22} = 0.0155$ $\gamma_{23} = 0.1203$

The final estimated model is as follows:
$K = 15.2584 Z - 0.8944 I + 9.8586$
$Z = 0.0525K + 0.0155P + 0.1203$

EXAMPLE 2. The following model with interdependent equations was built:

$$P_t = \beta_{12}WITH_t + \gamma_{211}S_t + \gamma_1 + \varepsilon_1$$
$$WITH_t = \beta_{23}k_t + \gamma_2 + \varepsilon_2$$
$$k_t = \beta_{32}WITH_t + \gamma_{232}AND_t + \gamma_3 + \varepsilon_1$$

Where:

- P – production in thous. pcs.,
- Z – employment in thous. people,
- K – value of fixed assets in PLN million,
- S – raw material consumption in thous. Tone,
- I – investment outlays in PLN billion.

Observations from the next 11 years are given in the table below:

t	p_t	$With_t$	k_t	p_t	$_{it}$
1	46	3.4	24	2.3	1.0
2	48	3.4	25	2.4	1.1
3	49	3.5	25	3.2	1.1
4	52	3.7	26	3.4	1.0
5	52	3.8	27	3.4	1.1
6	54	3.8	27	3.4	1.2
7	57	3.9	28	3.3	1.1
8	59	4.0	29	3.4	1.3
9	59	4.3	31	3.5	1.5
10	60	4.5	33	3.5	1.6
11	61	4.8	35	3.6	1.7

The first and third equations are uniquely identifiable, and the second equation is ambiguously identifiable.

The reduced form of the model after estimating the parameters using the classical method of least squares is as follows:

$P_t = 5.7338\ S_t + 11.8721\ I_t + 20.9805$

$WITH_t = 0.2888\ S_t + 1.4339 I_t + 1.1991$

$k_t = 1.6339\ S_t + 11.9946\ I_t + 7.9565$

We determine the values of the evaluations of the structural parameters of the first and third equations of the original model. We get the following system of equations:

$$\begin{pmatrix} 1 & -\beta_{12} & 0 \\ 0 & 1 & -\beta_{23} \\ 0 & -\beta_{31} & 1 \end{pmatrix} \begin{pmatrix} 5,7338 & 11,8721 & 20,9805 \\ 0,2888 & 1,4339 & 1,1991 \\ 1,6339 & 11,9946 & 7,9565 \end{pmatrix} = \begin{pmatrix} \gamma_{11} & 0 & \gamma_1 \\ 0 & 0 & \gamma_2 \\ 0 & \gamma_{32} & \gamma_3 \end{pmatrix}$$

For the first equation we have a system of equations:

$5.7338 - 0.2888\beta_{12} = \gamma_{11}$

$11.8721 - 1.4339\beta_{12} = 0$

$20.9805 - 1.1991\beta_{12} = \gamma_1$

After solving this system, we have: $\beta_{12} = 8.2796\ \gamma_{11} = 3.3427\ \gamma_1 = 11.0524$

For the third equation of the structural form we have the following system of equations:

$-0.2888\beta_{31} + 1.6339 = 0$

$-1.4339\beta_{31} + 11.9946 = \gamma_{32}$

$-1.1991\beta_{31} + 7.9565 = \gamma_3$

Hence we get: $\beta_{31} = 5.6576\ \gamma_{32} = 3.7720\ \gamma_3 = 1.1726$

The above calculations result in the following equations:

$P_t = 8.2796Z_t + 3.3427S_t + 11.0524$

$k_t = 5.6576Z_t + 3.7720\ I_t + 1.1726$

Consumer theory – spending systems

The consumer theory known from microeconomics explains how income is spent on the purchase of goods and services using a behavioral model that assumes that consumer preferences reflect utility functions and that in an optimal consumption plan we maximize utility under a budget constraint.

To illustrate this, suppose we have D goods that have positive prices $p = \begin{bmatrix} p_1 \\ \vdots \\ p_D \end{bmatrix}$ and the set of possible consumption plans $q = \begin{bmatrix} q_1 \\ \vdots \\ q_D \end{bmatrix}$ denoted as Q. Then the optimal consumption plan $q^* = \begin{bmatrix} q^*_1 \\ \vdots \\ q^*_D \end{bmatrix}$ when $m > 0$ is reached, it must meet the following conditions:

$U(q^*) = \max u(q)$ for $q \in Q$

$p^T q^* = m$

where u(q) is the utility function for the consumption plan q. The solution to this optimization problem is the system D of the demand function:

$q_j^* (m; p_1..., p_d)$, $j = 1, \ldots, D$,

representing the optimal consumption D of goods at given prices $p_1..., p_d$ and given income m. Demand $q_j^*(m; p_1..., p_d)$ corresponds to the optimal monetary expenditure:

$In_j^* (m; p_1..., p_d) = p_j q_j^*(m; p_1..., p_d)$.

Expenditure measurement errors or imperfect income allocations must be accounted for in the D-equation model, resulting in the following D-equation model:

$y_{t1} = W_1^* (m_t; p_{t1}..., p_{tD}) + \xi_{t1}$

$y_{tD} = W_d^* (m_t; p_{t1}..., p_{tD}) + \xi_{tD}$

where t is the observation number, $y_t = [y_{t1 \ldots} y_{tD}]$ is the tth observed expenditure vector for all D goods, and $\xi_{i.e}$ are random components representing errors in income allocation and expenditure measurement.

EXAMPLE 1. Linear spending system

Suppose that consumer preferences are characterized by the so-called Stone – Geary utility function:

$u(q) = \prod_{j=1}^{D} (q_j - \mu_j)^{\delta} j$, where $q_j > \mu_j \geq 0$. μ_j is the necessary purchase of the jth good, $\delta_j > 0$ $(j = 1, \ldots, D)$ and $\sum_{j=1}^{D} \delta_j = 1$. The above utility function leads to the following D-equational expenditure model:

$$y_{t1} = \mu_1 p_{t1} + \delta_1 (m_t - \sum_{j=1}^{D} \mu_j p_{i.e}) + \xi_{t1}$$

$$y_{tD} = \mu_d p_{tD} + \delta_d (m_t - \sum_{j=1}^{D} \mu_j p_{i.e}) + \xi_{tD}$$

where $\mu_j p_{i.e}$ is the necessary expenditure for the jth good (j = 1, …, D), the difference in brackets is the so-called free decision fund, i.e. the part of income that remains after all necessary expenses have been made, δ_j is interpreted as the share of spending on the jth good in the free decision fund.

The expenditure of an individual consumer depends on his income and on the prices of goods, while these expenditures do not affect the level of income and prices. In the model of a linear expenditure system, expenditures are linearly dependent on exogenous variables, hence its name.

A linear expenditure system can be presented in a matrix notation as:

$y_t + x_t \Gamma = \xi_t$

Where:

$y_t = [y_{t1} y_{t2} \ldots y_{tD}]$

$x_t = [p_{t1} p_{t2} \ldots p_{tD} m_t]$

$\xi_t = [\xi_{t1} \xi_{t2} \ldots \xi_{tD}]$

$(\delta_1 - 1)\ \mu_1 \delta_2 \mu_1 \ldots \delta_d \mu_1$

$\delta_1 \mu_2 (\delta_2 - 1)\ \mu_2 \ldots \delta_d \mu_2$

$\Gamma = \delta_1 \mu_d \delta_2 \mu_d \ldots (\delta_d - 1)\ \mu_d; -\delta_1 - \delta_2 \ldots - \delta_d$

When estimating the model, remember that:

1. matrix Γ of dimensions (D+1) x D, has (D+1)D elements that are functions of only 2D - 1 free structural parameters $\mu_{1, \ldots,} \mu_{D,} \delta_{1, \ldots,} \delta_{D-1}$ ($\delta_d = 1 - \delta_1 - \ldots - \delta_{D-1}$)
2. so that the budget constraint [$y_{t1} + \ldots + y_{tD} = m_t$ was met, the random components of the individual equations must add up to zero: $\xi_{t1} + \ldots + \xi_{tD} = 0$, so they must be linearly related.

Exponential smoothing

Exponential smoothing has become very popular as a forecasting method for many types of time series. This method was developed independently by Brown and Holt. Brown worked for the US Navy during World War II where he was assigned to develop a target tracking system used to locate submarines for fire control purposes. He later applied the technique to forecast demand for spare parts. Simple exponential smoothing model would be to consider each observation as consisting of a constant (b) and a random component (epsilon), that is: Xt = b + [ALFA - 1_t]. The constant b is relatively stable, that is, it can change slowly over time. If this is the case, one way to determine the true value of b, and therefore the systematic or predictable part of

the series, is to compute a type of moving average where the current and immediately preceding ("younger") observations are given more weight than the corresponding older observations. Simple exponential smoothing performs such a weighting where older observations are assigned exponentially smaller weights. The formula for simple exponential smoothing looks like this: st =Xt + (1-r) x St-1; where: Xt – the observed values of the series, and St – the smoothed values.

Following a recursive procedure, each new smoothed value is computed as a weighted average of the current observation and the previous smoothed observation; the previous smoothed observation was computed again from the previous observed value and the smoothed value before the previous observation, etc. Thus, consequently, each smoothed value is a weighted average of the previous observations, with the weights decreasing exponentially depending on the value of the parameter (alpha). If ALFA is equal to 1 (one), then previous observations are completely ignored; If ALFA is 0 (zero), then the current case is completely ignored, and the smoothed value consists entirely of the previous smoothed value (which in turn is computed from the smoothed case before it, etc.; thus all smoothed values will be equal to the initial smoothed value S0). Intermediate values ALFA will give intermediate smoothed values[16].

Although much research has been done on the theoretical properties of (simple and complex) exponential smoothing, the method gained popularity mainly because of its usefulness as a forecasting tool[17,18]. For example, an empirical study by Makridakis et al. (1982, Makridakis, 1983) showed that simple exponential smoothing produced the best one-period-ahead predictions out of 24 other time-series methods and using various measures of forecast accuracy (see also Gross and Craig, 1974 for other empirical examples). Thus, regardless of the theoretical model of the process behind the observed time series, simple Exponential Smoothing often provides quite accurate predictions.

Choosing the best parameter value ALFA(alpha). Gardner[19] considers various theoretical and empirical arguments for choosing a particular value for the equalization parameter. Of course, according to the formula presented earlier,should be between 0 (zero) and 1 (although Brenner[20] describes equalization for the ARIMA model where 0 < A < 2). Gardner (1985) reports that practitioners generally recommend that a value be less than 0.3. In practice, the smoothing parameter is often selected by a network search of the parameter space; that is, different solutions are tried starting, for example, with a value A = 0.1 to B = 0.9, with an increment of 0.1. Then chooses A so as to obtain the least sum of squares (or least mean square) of the

[16] https://www.statsoft.pl/textbook/stathome_stat.html?https%3A%2F%2Fwww.statsoft.pl%2Ftextbook%2Fsttimser.html

[17] See more: E. McKenzie, General exponential smoothing and the equivalent ARMA process, "Journal of Forecasting" 1984; 3: 333-344.

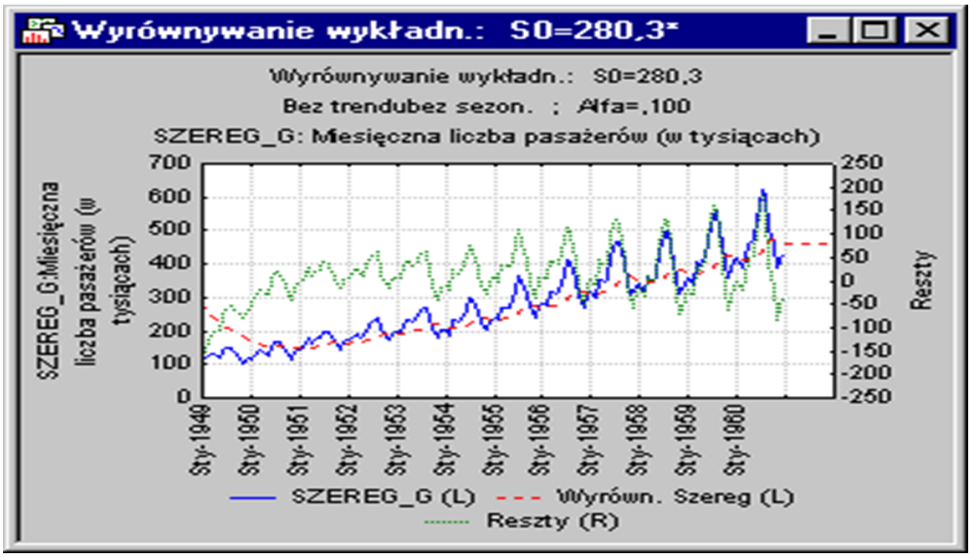
[18] E. McKenzie, Comments on 'Exponential smoothing: The state of the art' by E. S. Gardner, "Journal of Forecasting" 1985; 4: 32-36.

[19] E. S. Gardner Jr., Exponential smoothing: The state of the art, "Journal of Forecasting" 1985; 4: 1-28.

[20] J. L. Brenner, Difference equations in forecasting formulas, "Management Science" 1968; 14: 141-159.

difference between the empirical values and the values projected one period ahead; it is called ex post mean square error, abbreviated ex post MSE.

The easiest way to assess the accuracy of forecasts obtained at a specific value ALFA is to plot the observed values and forecasts one step ahead. This plot may also contain residuals (scaled on the right side of the y-axis), based on which it is easy to identify areas of better and worse fit.



Source: statisica STAT

Visually checking the accuracy of predictions is often the most powerful method for determining whether the current exponential equalization model fits the data. In addition to the ex post MSE criterion, there are other statistical measures of error that can be used to determine the optimal value of a parameter (see Makridakis, Wheelwright and McGee, 1983):

- Mean Error – The mean error (ME) value is calculated as the simple arithmetic mean error value (the average difference between the observed and forecast values one period ahead). Of course, the disadvantage of this measure is that positive and negative error values cancel each other out, so this measure is not a good indicator of overall fit.
- Mean Absolute Error – The value of the mean absolute error (MAE) is calculated as the average of the absolute values of the forecast error. If this value equals 0 (zero), the fit (forecast) is perfect. Compared to the value of the mean squared error, this measure of fit is less sensitive to outliers, that is, extremely large error values will affect the MAE value less than the MSE value. Sum of squares of the residuals (SSE), variance of the residual component. These values are calculated as the sum or mean of the square of the residuals, respectively. This is a very commonly used indicator of lack of fit in statistical fitting procedures.

– Percentage error (PE) – All of the above measures are based on the actual error value. However, it may seem reasonable to express the lack of fit in terms of the relative deviation of the predictions one step ahead of the observed values, that is, relative to the magnitude of the observed values. For example, when trying to predict monthly turnover, which can fluctuate severely (e.g., seasonally) from month to month, we may be satisfied if our prediction "hits the target" with about 10% accuracy. In other words, from a forecasting perspective, absolute errors may not be as interesting as relative errors. Various metrics have been proposed for estimating absolute error. The first, the percentage error value, is calculated as: PEt = 100*(Xt - Ft) / Xt; where: Xt is the observed value at time t, and Ft denotes the forecast (smoothed value).
– Mean percentage error (MPE) – this value is calculated as the average of the PE values. Mean absolute percentage error (MAPE). As with the mean error value (ME, see above), a mean percentage error close to 0 (zero) can be the result of positive and negative percentage errors canceling each other out. Thus, a better measure of relative overall fit is the mean absolute percentage error. In addition, this measure is usually easier to interpret than the variance of the residual component. For example, knowing that the average forecast deviates by 5% from actual values is a useful result in itself, while knowing that the variance of the residual component is equal to 30.8 is not directly interpretable.

Automatic search for the best value of the parameter. The quasi-Newtonian function minimization procedure (the same as in ARIMA models) is used to minimize either the mean squared error or the mean absolute percentage error. In most cases, this procedure is more efficient than network search (especially when more than one parameter needs to be determined), and the optimal value can be identified relatively quickly. The first smoothed value of S0. The last issue, which we have not addressed so far, is the problem of the initial value or how to start the smoothing process. If we go back to the formula shown above, we see that in order to calculate the smoothed value (forecast) for the first observation in the series, we need a value of S0. Depending on the choice of value (i.e., when it is close to zero), the initial value of the smoothing process can affect the quality of forecasts for many observations. As with most other aspects of exponential equalization, it is advisable to choose the initial value that gives the best predictions. On the other hand, in practice, when we have many preceding observations before the actual forecasted values, the initial value will not affect the forecasts as much, because its influence will fade due to exponentially decreasing weights (the older the observation, the less its influence on the forecast will be).

Conclusions

Data management is an administrative process that involves acquiring, validating, storing, protecting and processing the required data to ensure that information is available, reliable and timely for users. Organizations and enterprises have quite

recently been using massive amounts of data to make business decisions and gain deep insights into customer behavior, trends and opportunities to create exceptional customer experiences.

To add up the vast amount of knowledge that businesses collect, analyze and store today, companies are looking into data management solutions and platforms. Data management solutions make processing, validation and other essential functions simpler and less time-consuming.

Leading data management platforms allow companies to leverage Big Data from all data sources, in real time, to more easily engage with customers and increase customer lifetime value (CLV). Data management software is important because we are creating and consuming data at an unprecedented rate. The best data management platforms give companies and organizations a 360-degree view of their customers, and thus the full visibility needed to gain the deep, critical insights into consumer behavior that give brands a competitive advantage.

While some companies are good at collecting data, they don't manage it tolerably well to make sense of it. Simply collecting data is not enough; companies and organizations must understand from the outset that data management and analysis will only be effective if they first think about how they gain value from their data. They will then go beyond data collection with effective systems for processing, storing and validating data, including as effective analytical strategies.

Another knowledge management challenge arises when companies categorize data and organize it without first considering the answers they hope to get from the information. Every step of knowledge gathering and management must lead to the acquisition of relevant data and its analysis in order to extract the useful information needed to make data-driven business decisions.

The best thing to do through data management, and ultimately get the insights needed to make data-driven decisions, are to start with a business question and get the information needed to answer that question. Companies need to gather massive amounts of data from a variety of sources, and then use best practices when reviewing methods for storing and managing information, cleaning and extracting information, and then analyzing and visualizing the information to inform their business decisions.

It's important to remember that data management best practices end with better analytics. By properly managing and preparing information for analysis, companies optimize their Big Data.

A mature organization is able to run many different projects simultaneously, during which it excels at managing data, applications, budgets and available resources. Each project accomplishes its goals and often reaches the set business objective with more or less slippage. During the course of projects, business users are confronted with the same data from different source systems, but it appears in different standards, resulting in additional time needed for reconciliation and verification. End users of analysis and reports encounter inconsistencies between different reports and don't know where the inconsistencies come from, as neither source has adequate documentation or it is difficult to access.

From these examples, it can be seen that implementing a comprehensive data management strategy is first and foremost a time-saver, but also a much better use of any organization's existing resources. By implementing the right data management culture, organizations also have a chance to avoid data security incidents that can significantly damage their reputation.

Modern companies such as Interamerican, which wants to become a fully digital insurance company, know that trust is of paramount importance in terms of customer retention. The company focused on data governance as part of the rollout of its data management strategy, which involved identifying data owners, data processing locations, analyzing risks, and putting in place appropriate security policies. The company felt that these were key aspects that would reassure customers that their data was safe.

A comprehensive data management strategy can be thought of as a journey map that systematizes all data activities. This will ensure that every data processing or analysis activity will either use existing elements or add new ones that can be easily retrieved and used by others. In addition, all initiatives will be carried out with respect to relevant policies and procedures, ensuring an appropriate level of security and trust in the organization.

A comprehensive data management strategy consists of four key elements:

The first is identification. Here we are talking about processes to identify data and its meaning, as well as to catalog it. To support this, the recently popular data catalogs (data catalogs) found in solutions supporting data governance processes from various vendors are used.

The second element is storage and sharing. The main goal is to create mechanisms that are simple, but also secure and accessible. This is where virtualization mechanisms can help, allowing data stored in different ways to be shared in one place. It is worth highlighting a fundamental change in the approach to data sharing. It is crucial to implement reusability thinking in every data sharing process, even one-off ones. Related to reusability is the documentation and standardization of data, so that each subsequent user can find and retrieve it independently.

The third element is processes. Processes are supposed to support individual users in independently obtaining the necessary ready-to-use data from various systems. To get ready-to-use data, users must have free access to both the appropriate tools and the processes that will prepare it.

The last element is data governance, that is, the implementation, communication and management of policies and mechanisms for the effective use of data. Nowadays there are simply too many different systems and data sources for individuals to remember. It shouldn't be the case that knowledge of an organization's key resource – data – is passed verbally between individuals within the company.

The idea of a comprehensive data management strategy is not to build a perfect solution that will anticipate all possible cases. The strength lies in its ability to evolve with the entire organization. When new needs arise, existing mechanisms should be able to detect them. In addition, necessary changes should be identified

and implemented to develop existing procedures or processes. A comprehensive data management strategy is a plan of action and conduct for today's and future data management needs.

The next step in building a competitive advantage is to apply advanced analytics to key business processes. With the right data culture, embedding your operations strategy on analytics can begin to yield tangible benefits in a short period of time.

For years, the European Union has placed great emphasis on data sharing between countries and institutions, in order to improve the lives of citizens, strengthen European companies and achieve the mission of a united Europe, and to develop a data-driven economy.

The task of the new Data Governance Act regulations is primarily to increase market confidence in the sharing process and to ensure the security of processed data. For companies and government institutions, this means benefits in terms of sharing information and promoting their activities, but also the need to develop data management policies.

Free flow of data is a priority in the development of EU digital policy In its data strategy, the Commission described a vision of a common European data space, a single "market" for data where it could be used regardless of its country of origin.

The idea is to realize the potential of using voluntarily shared data for general interest purposes. Such purposes include health care, combating climate change, improving mobility, facilitating the production of official statistics or improving the delivery of public services.

The draft European Data Governance Act, published in November 2020, is a strategic level document. Thus, we won't find in it provisions on maintaining the data model, overseeing its quality or security. Instead, there are guidelines clearly indicating the need for Data Governance activities due to the overarching goal of ensuring that each entity has control over the processing and exchange of data. This assumption is shared by entities that share data (providers), as well as those who use it - intermediaries and recipients. Such a sense of oversight should increase the level of public confidence in the use of data and the development of various solutions, including business ones, and contribute to strengthening the mechanisms that define the rules for data exchange in accordance with other regulations in force across Europe, such as RODO.

The risk that member states will increasingly regulate data issues in an uncoordinated manner, fragmenting the single "market" for data access, has also been recognized.

Bibliography

Brenner J. L., Difference equations in forecasting formulas, "Management Science" 1968; 14: 141-159.

Flakiewicz W., Systemy informacyjne w zarządzaniu. Uwarunkowania, technologie, rodzaje, C.H. Beck, Warszawa 2002.

Gardner E. S. Jr., Exponential smoothing: The state of the art, "Journal of Forecasting" 1985; 4: 1-28.

Gorczyca E., Informacja naukowa z elementami naukoznawstwa, Wydawnictwo Szkolne i Pedagogiczne, Warszawa 1991.

Judge G. G., Griffith W. E., Hill R. C., Luetkepohl H., Lee T. S., The theory and practice of econometrics, Wiley and Sons, New York 1985.

Kłosiewicz-Górecka U., Źródła informacji i rodzaje potrzeb informacyjnych przedsiębiorstwa oraz przydatność informacji w zarządzaniu firmą, „Marketing i Rynek" 2015; 4: 9-15.

Maiti S. S., Mukherjee B. N., A note on the distributional properties of the Jöreskog-Sörbom fit indices, "Psychometrika" 1990; 55: 721-726.

Makridakis S. G., Forecasting, planning, and strategy for the 21st century, Free Press, London 1990.

McKenzie E., Comments on 'Exponential smoothing: The state of the art' by E. S. Gardner, "Journal of Forecasting" 1985; 4: 32-36.

McKenzie E., General exponential smoothing and the equivalent ARMA process, "Journal of Forecasting" 1984; 3: 333-344.

Morrison D. F., Multivariate statistical methods, McGraw-Hill, New York 1990.

Scheines R., Causation, indistinguishability, and regression, [in:] SoftStat '93. Advances in statistical software 4, Faulbaum F. (ed.), Gustav Fischer Verlag, Stuttgart 1994.

Schiffman S. S., Reynolds M. L., Young F. W., Introduction to multidimensional scaling: Theory, methods, and applications, Academic Press, New York 1981.

Schmidt F. L., Hunter J. E., Eight common but false objections to the discontinuation of significance testing in the analysis of research data, [in:] What if there were no significance tests, Harlow L. L., Mulaik S. A., Steiger J. H. (ed.), Lawrence Erlbaum Associates, New York 1997.

Shepherd A. J., Second-Order Methods for Neural Networks, Springer, New York 1997.

Speckt D. F., Probabilistic Neural Networks, "Neural Networks" 1990; 3(1): 109-118.

Woźniak K., System informacji menedżerskiej jako instrument zarządzania strategicznego w firmie, Akademia Ekonomiczna w Krakowie, Kraków 2005.

Statistica PRO website. Online: https://www.statsoft.pl/textbook/stathome_stat.html?https%3A%2F%2Fwww.statsoft.pl%2Ftextbook%2Fsttimser.html.

Eurostat. Online: http://www.forum.europa.eu.int/Public/irc/dsis/eurosam/home.

OECD. Online: http://stats.oecd.org/glossary/detail.asp?ID=2398.

European Central Bank. Online: http://www.ecb.int/pub/pdf/other/statseasonadjustmenten.pdf.

Bank of Spain. Online: http://www.bde.es/servicio/software/econome.html.

U.S. Census Bureau. Online: http://www.census.gov/srd/www/x12a/.

Statistics Denmark. Online: http://www.dst.dk/upload/seasonal.pdf.

*Tomasz Wołowiec**
*Dariusz Woźniak***
*Robert Szarota****
*Nghargbu K'tso*****
*Rifkatu Nghargbu******

SELECTED ISSUES OF MODELLING AND SIMULATION IN THE TEACHING OF ECONOMIC COURSES IN TRANSPORT, LOGISTICS AND MANAGEMENT

Wybrane zagadnienia modelowania i symulacji w dydaktyce przedmiotów ekonomicznych z zakresu transportu, logistyki i zarządzania

*PhD., DsC. Assoc. Prof., WSEI University in Lublin, ORCID: 0000-0002-7688-4231
**PhD., Assoc. Prof., School of Business – National-Louis University in Nowy Sącz (WSB-NLU), ORCID: 0000-0002-3580-0708
***MA, School of Business – National-Louis University in Nowy Sącz (WSB-NLU)
****Prof., Director Linkages & International Cooperation, Nasarawa State University Keffi, Nigeria, ORCID: 0000-0002-6320-6722
*****Prof., Nasarawa State University Keffi in Nigeria, ORCID: 0000-0001-9155-3521

Streszczenie

Ekonomia matematyczna to generalnie kierunek w ekonomii zajmujący się badaniem szeroko pojętych zjawisk gospodarczych przy użyciu różnorodnych technik matematycznych, takich jak analiza szeregów czasowych czy programowanie dynamiczne. Współczesna ekonomia w coraz większej mierze odwołuje się do tych metod (chociażby poprzez modele równowagi ogólnej gospodarki itp.), niemniej podział na matematyczny i instytucjonalny nurt w ekonomii jest wciąż widoczny. Jednymi z podstawowych zagadnień ekonomii matematycznej są modele wzrostu gospodarczego, równowagi ogólnej oraz analizy elastyczności cenowej, dochodowej, krzyżowej i efektywności społecznej, wymiany, konsumenta czy producenta.

Słowa kluczowe: *ekonomia matematyczna, symulacje, prognozowanie, podejmowanie decyzji, ekonomia menedżerska, efektywność, racjonalność, logistyka, transport*

Summary

Mathematical economics is generally a direction in economics that deals with the study of broad economic phenomena using a variety of mathematical techniques, such as time series analysis or dynamic programming. Modern economics increasingly refers to these methods (if only through general equilibrium models of the economy, etc.), but the division between the mathematical and institutional strands in economics is still apparent. Some of the basic issues of mathematical economics are models of economic growth, general equilibrium and analyses of price elasticity, income, cross-elasticity and social efficiency, exchange, consumer or producer.

Key words: mathematical economics, simulation, forecasting, decision-making, managerial economics, efficiency, rationality, logistic, tansport

Introduction

Simulation is the process of reproducing the properties of a given phenomenon (process) or space that occur in nature but are difficult to study and repeat. It allows you to conduct measurements and research at a selected place and time; making-based on given model and using spreadsheets, appropriate calculations, which then allow us to get an idea of the efficiency of the model or constitute a basis for drawing conclusions about the behavior of the system described by the economic model. The reason for creating simulation models is not only the desire to learn about reality and the laws governing it, but also to explore the possibilities of influencing the phenomena surrounding us, to study phenomena in other conditions and in the future[1,2,3,4,5]. A mathematical model is a set of symbols and mathematical relations along with absolutely strict rules for operating them. Symbols and relationships refer to specific elements of the reality we study. The model describes a given phenomenon using variables whose values may belong to various values, e.g. integers, real numbers, logical

[1] More: J. Górka, W. Orzeszko, W. Wata, Mathematical economics: materials for exercises, C.H. Beck Publishing House, Warsaw 2009.

[2] M. Gruszczyński, M. Podgórska, Econometrics, SGH, Warsaw 2004.

[3] E. Panek, Mathematical economics, AE in Poznań, Poznań 2003.

[4] E. Panek, Fundamentals of mathematical economics. Materials for exercises, AE in Poznań, Poznań 2002.

[5] T. Tokarski, Mathematical economics. Macroeconomic models, PWE, Warsaw 2011.

values, etc.[6,7,8,9,10,11,12,13]. Mathematical modeling is used in many areas of life, mainly in those where there is repeatability or similarity of events, i.e. in economic sciences.

Economic decisions are those whose consequences we consider in terms of profits and losses, so before we make them, we analyze the situation, establish decision selection criteria and look for optimal solutions. In such cases, methods of quantitative research of regularities occurring in economic phenomena, which could be broadly called econometrics, turn out to be helpful. Economic research uses a variety of methods developed by many disciplines of mathematics, primarily mathematical analysis, linear algebra, probability theory, mathematical statistics, mathematical programming, operations research, the theory of stochastic processes, differential and difference equations, stochastic differential equations, etc. Mathematical modeling is present in macro and microeconomics, business management, marketing, economic logistics, transport economics, regional management, finance, banking and insurance.

In practice, simulation methods can be divided into two basic classes[14,15,16,17]:

- deterministic simulation – random components of the model are omitted, which – in linear models – means operating with the expected values of individualvariables,
- stochastic simulation – the random component and the properties of its distribution are taken into account (vprogramthen an appropriate subroutine must be built into the computational engine that generates the implementation of the random component and takes into account the actual properties of its distribution).

An economic model is used to obtain a simplified view of reality. Trying to present the entire economic reality is pointless and doomed to failure due to the infinite number of details. The simplifying assumptions of an economic model may concern any issue:

- e.g. earningssociety(every citizen has the same salarynational average),
- state foreign policy (the state does not maintain any economic relations with foreign countries),
- or basic economic categories such asprice: (the price for a given service will not change within two years) orinflation(it will remain constant within two years).

---

[6] More: W. Kulapa, Mathematical aspects of economics, Cardinal Stefan Wyszyński University Publishing House, Warsaw 2008.

[7] H. Kordzikowski, Life insurance contract, Faktor, Wrocław 1999.

[8] W. Ronka-Chmielowiec, Risk in insurance - assessment methods, AE, Wrocław 1997.

[9] T. Sangowski, Business insurance, Poltext, Warsaw 1998.

[10] T. Bednarski, Elements of mathematics in economic sciences, Oficyna Ekonomiczna, Warsaw 2004.

[11] S. Kanas, Fundamentals of mathematical economics, PWN, Warsaw 2011.

[12] E. Panek, Mathematical… op. cit.

[13] E. Panek, Fundamentals… op. cit.

[14] L. R. Klein, Lectures on econometrics, North-Holland, Amsterdam 1983, pp. 108-140.

[15] A. Maciąg, Forecastingand simulation in the enterprise, PWE, Warsaw 2013, p. 149-150.

[16] M. Pawlak, Symulacja Monte Carlo w analizie ryzyka projektów inwestycyjnych, „Zeszyty Naukowe Uniwersytetu Szczecińskiego. Finanse, Rynki Finansowe, Ubezpieczenia" 2012; 51: 83-94.

[17] Z. Pawłowski, Elements of econometrics – textbook, PWN, Warsaw 1981, p. 302-307.

Types of economic models:
- permanent income model,
- diffusion model,
- hierarchy of effects model,
- IS-LM model,
- one-step preference model,
- Solow growth model,
- Baumol-Allais-Tobin (BAT) model.

Conducting a simulation enables the analysis of the process in various variants, which are verified virtually, so they do not affect the process activity in real time. However, based on well-developed control parameters consistent with the actual situation, it can be concluded with high probability that the analyzed process variant has a chance of being implemented in economic reality. Every simulation requires the definition of basic principles[18]:
- in the case of complex processes subject to simulation, it is necessary to select the appropriate tool used for simulation and detailed modeling of the parameters of the analyzed process and the system in which it operates, define the input data and determine the goal;
- in the case of flexible processes subjected to simulation, it is necessary to frequently change the values of control parameters;
- basing the analysis on average parameter values carries the risk of incorrect interpretations;
- the simulation must be performed at the appropriate time to achieve the greatest benefit.

The simulation model design procedure includes the following stages:
- identification of the object being simulated using one of two approaches: top-down, in which the main process is detailed into sub-processes and activities; bottom-up, which starts with defining all activities and, in the next stage, grouping them into sub-processes and main processes;
- developing diagrams of the process being simulated using IT tools (the number of hierarchy levels depends on the detail of the analyzed process);
- collecting input data and parameters and then entering them into the simulation model;
- model verification, which involves comparing the behavior of the simulation model with the actual behavior of a given system.

[18] Citation: A. Koliński, B. Śliwczyński, P. Golińska-Dawson, The use of simulation as a tool supporting the process of assessing production efficiency in manufacturing enterprises, "e-mentor" 2018; 3(75): 80-90.

Simuation

Simulation is one of the methods of quantitative analysis of decision-making problems, the main advantage of which is the ability to evaluate solutions without the need to implement them in the market reality. A very common solution is to use spreadsheets for simulation, but they can only be used for simple simulation processes that do not require graphical representation. Specialized simulation programs enable simulations in a wide analytical range and often require the programming of dedicated macrodefinitions. The complexity of the production process makes the construction of simulation models time-consuming and error-prone[19].

The methodology for carrying out simulation verification is based on the basic assumption of multiple simulation, presented in Figure 1.

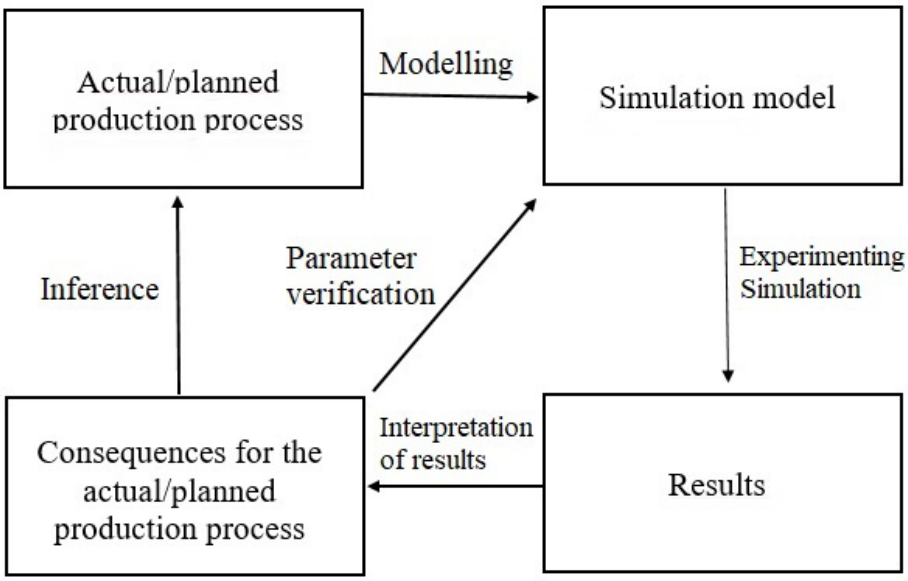


Figure 1. Classic multiple simulation process setup

Source: K. H. Dullinger, Simulation in der Logistik – new Anwendungsfelder, "LogForum" 2009; 5(3): 2

The effectiveness assessment model should include an analysis of the process both in economic (financial and cost) terms and in operational terms. The goals and measures of the production process efficiency analysis should result from the company's vision and strategy. An analysis of the efficiency of the production process should be considered complete when it refers not only to those measures that concern past results, but also to measures that allow for anticipating the impact on future results.

[19] G. Kłosowski, The use of computer simulation in controlling the furniture production flow, "Enterprise Management" 2011; 2: 29-37.

Process simulation capabilities have a significant impact not only on the implementation of production processes, but also logistics throughout the supply chain.

Marginal function

Mathematical economics is a major ineconomics,which studies economic phenomena and processes based on techniquesmathematicale. One of the basic issues of mathematical economics are modelseconomic growth and job search. For most people, economics, due to numbers, is associated with mathematics and this is partly why they do not intend to deal with it. However, just as knowledge of mathematics is certainly useful in everyday life, economics is not a science detached from reality[20,21,22,23,24,25,26,27,28,29,30]. The reason for creating models is not only the desire to learn about reality and the laws governing it, but also to explore the possibilities of influencing the phenomena surrounding us, examining phenomena in other conditions and in the future.

Assumptions

R = [0, ∞]. Function C: R → R describes the cost of producing a certain good depending on the number of units produced. For x ∈ R, the quantity C (x) means the cost of producing x units of the good. We will call function C the total cost function. Further, for x > 0, the quantity: c(x) = C(x). Therefore, the function c : (0,∞) → R is called the average cost function. Let x0 ∈ R+, Δx > 0 then the difference quotient[31]:

$$\frac{C\left(x_0+\Delta x\right)-C\left(x_0\right)}{\Delta x},$$

means the average cost of producing additional Δx units of a good at the production level x0.

[20] More: T. Tokarski, Mathematical economics. Microeconomic models, WNT, Warszawa 2011.

[21] H. U. Gerber, Life insurance mathematics, Springer-Verlag, Berlin 1990.

[22] D. Bego, S. Fischer, R. Dorenbusch, Microeconomics, PWE, Warsaw 2007.

[23] W. Kulapa, Mathematical aspects… op. cit.

[24] H. Kordzikowski, Life insurance… op. cit.

[25] W. Ronka-Chmielowiec, Risk… op. cit.

[26] T. Ssangowski, Business… op. cit.

[27] T. Bednarski, Elements… op. cit.

[28] S. Kanas, Fundamentals… op. cit.

[29] E. Panek, Mathematical… op. cit.

[30] E. Panek, Fundamentals… op. cit.

[31] Analysis cited from: Fundamentals of Mathematical Economics. Online: https://docplayer.pl/56946316-1-zastosowanie-rachunku-ro-niczkowy-i-caakowy-w-ekonomii.html.

$$C'(x_0) := \lim_{\Delta x \to 0} \frac{C(x_0 + \Delta x) - C(x_0)}{\Delta x},$$

if it exists, we call it the seamstress (marginal) cost of production at the production level x0. Assuming the differentiability of the function C, the function C0 is called the marginal cost function. We also have that for small Δx => C (x0 + Δx) − C (x0) ≈ C0 (x0) Δx, which, considering Δx = 1 as a small quantity, gives approximate information that if we increase production from level x0 units by one unit, the production cost will increase by C0 (x0). The production volume x0 for which the average cost c(x) of producing a unit of a given good by the enterprise reaches the lowest value is called the technological optimum.

Example – the cost of producing x units of production for x ≥ 0 is determined by the function C(x) = x3 − 60x2 + 1528x. The marginal cost function, i.e. the derivative of function C, has the form C0(x) = 3x2 − 120x + 1528. For an output of x = 5, the cost of producing an additional unit will be C (6) − C (5) = 7224 − 6265 = 959, and the marginal cost has the value C0 (5) = 1003 units, so using the marginal cost interpretation gives a very approximate result. If x = 100, then the cost of producing an additional unit is C (101) − C (100) = 572,569 − 552,800 = 19,769, and the marginal cost is C0(100) = 19,528 units. So we see that even using the value of producing an additional unit of a good approximated by the marginal cost function, we can draw the conclusion that increasing production is more profitable at the level of production x = 5 units than at the level of x = 100 units. Then the average cost is determined by a function of the form:

$$c(x) = \frac{C(x)}{x} = x^2 - 60x + 1528.$$

We therefore have that the minimum value of the function c is achieved for x = 30. Therefore, the production volume x = 30 is the technological optimum. Note also that c(30) = 628 = C0(30).

Let x0 be the technological optimum, then c(x0) = C0(x0). Let x0 be the production quantity. Since x0 is the technological optimum, then:

$$c'(x_0) = 0 \Leftrightarrow \left(\frac{C(x)}{x}\right)'_{x=x_0} = 0$$

Hence:

$$\frac{C'(x_0)x_0 - C(x_0)}{x_0^2} = 0$$

That is:

$$\frac{C(x_0)}{x_0} = C'(x_0),$$

therefore: *c*(x0) = C0(x0).

The last equality means that the marginal cost curve intersects the average cost curve at the point marking its minimum.

Let's assume that a certain company sells goods. Let x ≥ 0 denote the number of

units of the product sold by this plant. Let us denote by U(x) the total revenue, i.e. the revenue from the sale of x units of goods. The function U : R+ → R+ is therefore a function of total revenue, i.e. a function describing the amount that the company will receive for selling x units of goods. Assuming that U is a differentiable function, the rate of change of the plant's revenue when selling x units is:

$$U'(x) = \lim_{\Delta t \to 0} \frac{\Delta U}{\Delta x} .$$

As in the case of cost, U0 is called the marginal revenue function. Therefore, marginal revenue U0 is equal to the increase in sales if we increase it by an additional unit of goods. Let's assume that a certain plant produces and sells a product. Let Z(x) denote the total profit of the enterprise when producing and selling x units of the product.

The function Z : R+ → R+ is called the total profit function. Therefore: Z(x) = U(x) − C(x) for x ≥ 0, where U(x) means revenue and C(x) the total cost of producing x units of a given product. Hence, if x0 is the production volume for which the company achieves maximum profit, then C0(x0) = U0(x0), i.e. the marginal cost for production of x0 is equal to the marginal revenue for x0.

Example – the sales price of the product is r wine p(x) = 40 − 0.03x, where x is the number of units of the product. The total cost of x units of a product in a certain plant is given by the formula C(x) = 0.01x2 + 20x + 225. For what production volume is the profit per unit of product the highest?

C^0(x) = 0.02x + 20, Z (x) = (xp(x) − C (x)) = 20x − 0.04x2 − 225, Z0 (x) = −0.08x + 20.

Let x0 be the production volume corresponding to the maximum profit, then U0(x0) = C0(x0), whence x0 = 250.

Functional flexibility

Economic models (or parts of models) are often expressed using mathematical functions. A function is a measure of the sensitivity of one variable to changes in another, used in economics. For example esupply elasticitymeasures the response of the quantity offered (supply) of the goods to the change of its price[32]. Demand elasticity- is a concept used to measure the strength with which demand responds to changing prices. This concept is based on the assumption thatincomeand other prices have not changed[33,34]. Price elasticity of demandit is the ratio of the relative (percentage) change in the quantity demandeddatagoodto the relative (percentage) change in its price. Cross price elasticity of demandfor good i relative to changes in the price of good j is the relationship between the relative (percentage) change in the demand for

[32] T. C. Bergstrom, H. R. Varian, Microeconomics – exercises, PWN, Warsaw 2003.

[33] M. Rekowski, Introduction to microeconomics, Polsoft-Akademia, Poznań 1994.

[34] D. Rommer, Macroeconomicsfor advanced, PWN, Warsaw 2000.

good i and the relative (percentage) change in the price of the good. Income elasticity of demandis the ratio of the relative (percentage) change in demand for a specific good to the relative (percentage) change in income. E arc elasticity of demand the ratio of the change in one variable to the relative change in another relative, measured on a discrete interval between two points on the curve. It can be measured directly[35]. Point elasticity is the limit of arc elasticity when the distance between these points approaches zero. Point elasticity cannot be measured directly; it can be measured by statistical inference based on current observations[36]. The elasticity of imports with respect to domestic demand determines the ratio of the growth rate of imports to the growth rate of domestic demand[37].

In economics, functions often describe cause and effect. The variable on the left side of the equation is the explained variable ("effect"). The variables on the right are explanatory variables ("causes"). For example, y = b + mx X. A variable is a quantity that can take on a certain range of values. In the above equation of the line, x and y are variables, with x on the horizontal axis, y on the vertical axis, and bim are parameters determining the shape of the line[38]. For example, in the equation: y = 10 + 4x, describing a specific linear function, the parameter b is 10 and the parameter m is equal to 4[39]. Let f : (a, b) → R, ((a, b) ⊂ R+), x0 ∈ (a, b) and let Δx be an increment such that (x0 + Δx) ∈ (a, b). The relative increase in the value of the function f for the argument x0 and the increase Δx is the number: $\frac{\Delta y}{y} := \frac{f(x_0 + \Delta x) - f(x_0)}{f(x_0)}$,as long as f(x0) ≠ 0.

Number $\frac{\Delta x}{x_0}$ we call the relative argument increment for the argument x0. The average elasticity [Ex0, Δxf.] of the function f in the interval (x0, x0+Δx) is the ratio of the relative increase of the function to the relative increase of the argument:

$$\frac{f(x_0 + \Delta x) - f(x_0)}{f(x_0)} \cdot \frac{x_0}{\Delta x}$$

The elasticity of the function f at the point x0 is called the limit (if it exists): $\lim_{\Delta x \to 0} E_{x_0, \Delta x} f$ and we denote Ex0f. For example, if Δx = 0.01x0 = 1% x0, then:

$$E_{x_0} f \approx E_{x_0, \Delta x} f = \frac{f(x_0 + \Delta x) - f(x_0)}{f(x_0)} \cdot 100\%$$

The elasticity Ex0f is therefore (approximately) a measure of the average percentage increase in the value of the function f, corresponding to an increase in the value of the argument x by 1%.

[35] P. A. Samuelson, W. D. Nordhaus, Economics, PWN, Warszawa 2004.

[36] J. Black, Dictionary of Economics, PWN, Warsaw 2008.

[37] J. Bremond, J. F. Couet, M. M. Salort, Compendium of knowledge about economics, PWN, Warsaw 2005.

[38] Quoted in: S. A. Greenlaw, D. Shapiro, W. Karpa, P. Maszczyk, Microeconomics – basics, OpenStax Poland, Warsaw 2022.

[39] Quoted in: T. Warowny, A. Surowiec, Quantitative market analysis, Lublin University of Technology, Lublin 2019.

Therefore, if f(x0) ≠ 0, then: $E_{x_0} f = f'(x_0)\frac{x_0}{f(x_0)}$ therefore: $\lim_{\Delta x \to 0} E_{x_0,\Delta x} f = \lim_{\Delta x \to 0} \frac{f(x_0+\Delta x)-f(x_0)}{\Delta x} \cdot \frac{x_0}{f(x_0)} = f'(x_0)\frac{x_0}{f(x_0)}$

If the argument x of the function f increases op% from a certain initial value x0, then the value of the function changes by q%, where: q ≈ pEx0 f. Let x0 be the initial value. Suppose that the argument x increased op%, which caused the value of the function to change by oq% (counting from f(x0)), then: $f(x_0 + \frac{p}{100}x_0) - f(x_0) = \frac{q}{100}f(x_0)$

We have that: f (x0 + Δx) – f (x0) ≈ f0 (x0)Δx, hence:

$$E_{x_0} f = \frac{x_0}{f\,(x_0)} f'\,(x_0) \approx \frac{x_0}{f\,(x_0)} \frac{f\,(x_0+\Delta x) - f\,(x_0)}{\Delta x}$$

By accepting Δx = p : 100 x X0 , then: $E_{x_0} f \approx \frac{x_0}{f(x_0)} \frac{\frac{q}{100}\cdot f(x_0)}{\frac{p}{100}x_0} = \frac{q}{p}$, therefore q ≈ pEx0f.

Example: We will calculate the elasticity of the function: $f(x) = \frac{2x}{x+8}$, $x > 0$ at the point x0 = 2.

Because $f'(x) = \frac{16}{(x+8)^2}$, therefore: $E_{x_0} f = \frac{1}{2}(x+8)\frac{16}{(x+8)^2} = \frac{8}{x+8}$.

For x0 = 2 we have E2 f = 0.8. This means that if x0 = 2 increases by 1%, the value of f will increase by approximately 0.8%. We will compare this result with the exact result[40]: $f(x_0 + 0.01x_0) = f(2+0.02) = f(2.02) = \frac{2\cdot 2.02}{2.02+8} = \frac{4.04}{10.02} = \frac{202}{501}$ and $f(x_0) = f(2) = \frac{4}{10} = 0.4 \cdot$

Therefore: $\frac{f(x_0+0.01x_0)}{f(x_0)} \cdot 100\% = \frac{\frac{202}{501}}{0.4} \cdot 100\% = \frac{202}{501} \cdot \frac{10}{4} \cdot 100\% = \frac{505}{501} \cdot 100\% \approx 100.798\,403\,2$ i.e. the increase was 0.7984032%. Using the formula for the elasticity of a function at a point, the solution is much shorter. The value of pEx0 f is exactly equal to the percentage by which the value of the function increases as the argument op% increases, if the function is linear. This results directly from the fact that for a linear function f the formula holds: f (x0 + Δx) – f (x0) = f0 (x0)Δx.

[40] Quoted from: T. Warowny, A. Surowiec, Quantitative… op. cit.

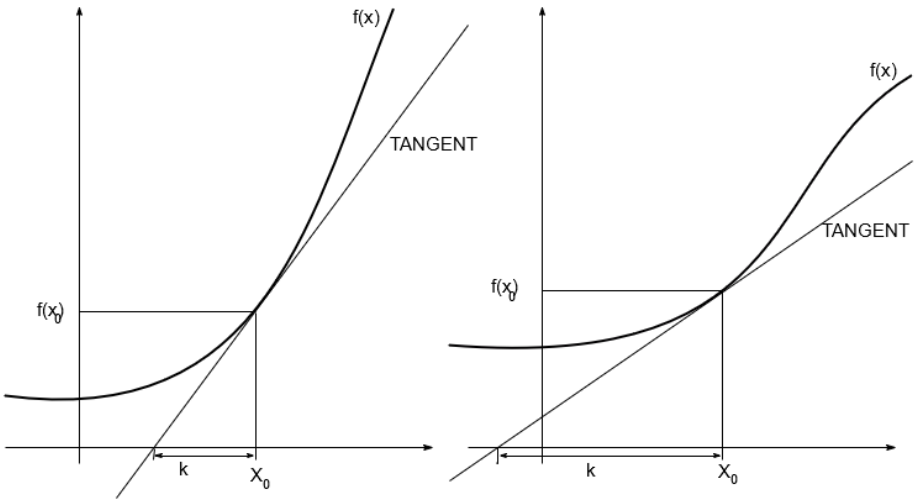


Figure 2. Flexibility of the function f at point X0
Source: own study

Flexibility of cost functions and their calculation

Let C : R+ → R+ denote the total cost function (C(x) denotes the total cost of producing x units of the product). Assume that C is differentiable. Then the cost elasticity (assuming that C(x) > 0) is $E_xC = \frac{x}{C(x)}C'(x)$.

If c denotes the average cost function, then[41]: $E_xC = \frac{C'(x)}{c(x)}$.

The elasticity of total cost is therefore equal to the ratio (quotient) of total cost to average cost.

For average cost c we have: $E_xc = \frac{x}{c(x)}c'(x)$

The elasticity of total cost is one greater than the elasticity of average cost: *Exc*+ 1 = ExC.

$$E_xc = \frac{x}{c(x)}c'(x) = \frac{x}{\frac{C(x)}{x}} \cdot \left(\frac{C(x)}{x}\right)' = \frac{x^2}{C(x)} \cdot \frac{xC'(x) - C(x)}{x^2} = \frac{x}{C(x)}C'(x) - 1 = E_xC - 1$$

Division calculation allows you to determine the unit cost of a product by dividing the total cost by the number of products or services produced. The unit cost is determined in this calculation according to the formula:

[41] Quoted from: T. Warowny, A. Surowiec, Quantitative… op. cit.

kj = Kc : Xj[42]

Simple division calculation with an inventory of unfinished production - in practice, a company produces, in addition to the finished product, the so-called a work-in-progress product that is an element of unfinished production. Therefore, kj = Kc – Kc work in progress: Xj. We can also express it by the formula: kj = Kc : (Xj + X unfinished production x % of throughput)

Example – a manufacturing company incurred the following costs: direct materials – PLN 3,550, direct wages – PLN 2,485, departmental costs – PLN 1,775, total costs – PLN 7,810. In the current month, 80 pieces of product and 40 pieces of semi-finished products processed at 50% from the point of advancement of the production process were produced. Moreover, it is known that the planned cost of producing semi-finished products is as follows: direct materials – PLN 710, direct wages – PLN 497, departmental costs – PLN 355, total costs – PLN 1,562.

Determine the unit cost of producing the two variants:

- I variant: kj = 7810 – 1562 : 80 = 78.10;
- II variant: kj = 7810 : 80 + (40 x 0.5) = 78.10.

Simple division calculation using processing costs. The processing cost is the sum of direct wages and departmental costs. Unfinished production can be reported from the point of view of incurred processing costs (this is due to the fact that in the case of production of both finished products and unfinished production, we will always use 100% of the basic materials, while in the case of unfinished production, processing costs are consumed according to the actual level of advancement). In the case of this calculation, unit calculation of material and unit calculation of processing are performed separately. This situation can be presented according to the following formulas:

- kj = kj materials + kj processing [Processing cost = direct wages + department costs];
- kj of processing = (direct wages + departmental costs): (Xj + X of unfinished production x % of processing).

Optimization models

Optimization models that originate from mathematical decision theory and operations research. Their aim is to support the process of selecting the right solution and making the optimal decision. The optimal decision in the sense of managerial economics is one that, under the conditions of a specific criterion, the so-called objective function and constraints assumes obtaining such values that allow the model

[42] Quoted from: http://qmamfinanse.pl/rachunek-kosztow/metody-kalkulu-kosztow/ [date 30/03/2023].

to be optimized by obtaining maximum benefits or minimum losses[43,44,45]. If the problem is presented using an optimization model, we usually use mathematical programming methods to solve it.

Example – let's assume that to produce two products X and Y we need two raw materials A and B. As a result of sales, we obtain the following amounts: profit for a unit of product[46].

Table 1. Standards of unit consumption of individual raw materials

	Unit consumption of raw material per unit of product	
Raw material	X	Y
A	a11	a12
B	a21	a22

Where: aij consumption of the i-th raw material for the production of the j-th product

To build a mathematical model, we should have information about the available quantities of individual raw materials. Let's assume that we have: raw material A* in the amount of A units and raw material B in the amount of B*. The decision-making task is to develop a production plan that, taking into account existing conditions, will allow achieving maximum profit.

The linear programming model, the solution of which is the basis for the decision, can be presented as follows: Z1 x X + Z2 x Y => max. Which means that we want to obtain the highest possible profit from the production of products X and Y.

Assumptions: $\alpha_{11} \cdot X + \alpha_{12} \cdot Y \leq A^{*}; \alpha_{21} \cdot X + \alpha_{22} \cdot Y \leq B^{*}$, which means that the production volume cannot be higher than the available raw material allows. Since we cannot have negative production, therefore: $x \geq 0$ i $Y \geq 0$.

In the mathematical sense, we call the presented task an optimization one, in which the extreme of the function (objective) must be determined under the adopted constraints.

Many decision-making problems are solved using simulation models. The simulation process consists in the fact that, using a model, the decision-maker tries to describe reality as best as possible. Models of this class are used for such complex situations when optimization methods fail. Simulation modeling can also be used to complement optimization models such as linear programming. Then we can check more elements and determine the effects of changing restrictions or different

[43] E. Urbanowska-Sojkin, P. Banaszyk, H. Witczak, Strategic management of the enterprise, PWE, Warsaw 2017.

[44] Collective work, Company management. Strategies, structures, decisions, identity, PWE, Warsaw 2007.

[45] M. E. Porter, Competitive Strategy, PWE, Warsaw 1992.

[46] https://edu.pjwstk.edu.pl/wyklady/poz/scb/index39.html.

developments in profit and cost ratios. Simulation as a technique supporting planning decisions is used in large organizations that have appropriate resources. In economic practice in Poland, simulation modeling is used, among others, for macroeconomic modeling of economic and social processes. Such models are used here for planning, among others: state budget and public funds or public debt, or modeling various demographic processes. Simulation models on a microeconomic scale are used in the process of developing and projecting business plans. Forecasting models are used to make decisions about the future. The basis for these decisions is to determine whether the examined value will develop favorably or unfavorably in the future. In the latter situation, we will be dealing with the so-called warning forecast. Forecasts are an important element in making planning decisions, both short-term and long--term. Forecasting models are used by both small and large organizations. Models of this type are used for strategic planning, especially for building business plans.

Econometric methods are used to solve the most complex economic problems. The tool for analyzing the decision-making problem is a descriptive econometric model. The process of learning the mechanism of a decision-making problem involves building the so-called parameter estimation model and inference based on it. An econometric model is a formal description of the stochastic dependence of a distinguished quantity, phenomenon or course of an economic process (phenomena, processes) on the factors that shape them, expressed in the form of a single equation or system of equations. The structure of each equation is determined by: the explained variable, explanatory variables (non-random or random) having established economic content, structural parameters, a random variable (traditionally called the random component) with unknown content and a specific type of functional relationship between the explained variable and the explanatory variables and the random component. The relationships between economic phenomena are very complex and multidirectional. The examined decision-making problem is influenced by many economic, social, demographic, natural, etc. phenomena, and the impact of these factors is diverse.

Example – from economic theory we know that there is a negative relationship between the volume of demand and the price of a given good. We can write: q = f(c). This is an economic model (mathematical economics model), where: q – demand for tomatoes in kg, ac – price of tomatoes in PLN/kg. However, we know that this is only a model and it can take various forms.

We can write, for example: q = f (c, d, cw, cp, s, p ....), where: *q* – volume of demand for tomatoes in kg, *c* – price of tomatoes in PLN/kg.

According to the concept of the econometric model: qt = f (ct, dt, cwt, cpt, st, pt, ...Et) – theoretical form of the econometric model, which will be estimated for T observations (t = 1, 2, ..., T) to verify the a priori assumption (apriori) economic theory, etc.

A development trend model in which the development of a phenomenon over time is described and examined (economic, social, regional, local growth, etc.). Decision-making games are a tool that allows you to analyze and predict rational

behavior of people in competitive situations. The premise is that we can represent almost any situation as a game. The tools used in decision-making games are intended to determine the relationship between customers and competitors on price changes as well as the introduction of a new product to the market. The simplest situation can be described using the so-called model. a two-player game with a sum of winnings equal to zero.

Graphical models are used to support the decision-making process regarding work organization. Graphical models are presented on the basis of methods supporting decisions in the process of planning and implementing design work, even for large and complex problems such as Gantt charts and network charts. A Gantt chart is a graphical way of planning and control. Actions are the basic element. The project consists of individual activities, which are presented using horizontal lines. For each activity, its duration and start and end dates are specified. The relationships between activities are shown using vertical lines. For those activities that are particularly important, charts are supplemented by setting so-called milestones. Such a milestone may be the date of making a decision regarding: delivering a product to customers, developing project assumptions, purchasing a computer system, etc. Milestones determine selected completion dates for individual stages of the entire project. The advantage of Gantt charts is their transparency. Non-specialists can also benefit from their help. At any time, we can determine what activities have already been completed, what activities are being implemented and what activities are planned to be implemented.

Dynamic models in economics

Let us assume that we are dealing with n ≥ 1 branches of the economy. Let t denote discrete time, representing the sequential number of a certain period in which we assume that the production of individual branches is constant. Let further be Xi (t) the global volume of production of i – this branch (i = 1, ..., n) in period t, xij (t) the volume of production of i – this branch consumed by j – this branch in period t, Yi (t) the final production volume of the i – branch in period t. We assume that the global production vector and the production volumes of individual branches consumed by other branches and the final production are functions of discrete time[47,48]:

- N U {0} 3 t 7→ X^{-} (t) = [X1 (t),..., Xn (t)]T global production vector,
- N U {0} 3 t 7→ xij (t),
- N U {0} 3 t 7→ Y^{-} (t) = [Y1 (t),..., Yn (t)]T final production vector.

[47] D. Curtis, I. Irvine, Macroeconomics Theory, Models & Policy, Lyryx, 2017.

[48] R. Dornbush, S. Fischer, Macroeconomics, McGraw-Hill Publishing Company, New York 1987.

During each period, we assume that the same assumptions are met as in the case of the open static model. For a fixed t, all properties, including the solution formula, are true for this model. We also assume that the input matrix in A is a constant matrix (having the same terms for all periods in)[49].

Model derivation – we assume that in each subsequent period t + 1 we want to increase production compared to the previous period t. We can do this by allocating part of the final product Y^- (t) to investments.

Let's set t => Y^- (t) = S^-(t) + C^- (t), where: S^-(t) – investment vector, S^-(t) = [S1 (t), ..., Sn (t)]T, i.e. the product that will be used as an input in the next period t + 1, C^-(t) – vector of pure final product, C^- (t) = [C1 (t), ..., Cn (t)]T, (not used in the next period t + 1 as an input in any industry).

We further assume that for each i = 1, ..., n Si (t) is distributed among investments in each of the j branches of the economy (j = 1, ..., n), i.e.

$S_i(t) = \sum_{j=1}^{n} s_{ij}(t)$, for i = 1 ,..., n, where sij (t) is the amount of investment in the i – branch allocated to investments in the j – branch.

Let us assume that the size of sij is proportional to the increase in the global production of the j-th branch in the period t + 1, i.e. sij (t) = zij (Xj (t + 1) + X (t)) for i = 1, ..., n, j = 1, ..., n, where the constant zij is the so-called investment factor.

Consequently, towards $S_i(t) = \sum_{j=1}^{n} s_{ij}(t) = \sum_{j=1}^{n} z_{ij}(X_j(t+1) - X_j(t))$ for i = 1, ..., n.

That is $\begin{bmatrix} S_1 \\ \vdots \\ S_n \end{bmatrix} = \begin{bmatrix} z_{11} & \cdots & z_{1n} \\ \vdots & \ddots & \vdots \\ z_{n1} & \cdots & z_{nn} \end{bmatrix} \begin{bmatrix} X_1(t+1) - X_1(t) \\ \vdots \\ X_n(t+1) - X(t) \end{bmatrix}$

Denoting the investment coefficient matrix by Z = [zij]i=1, ..., n, j=1, ..., n we have: $\bar{S}(t) = Z \cdot \left(\bar{X}(t+1) - \bar{X}(t)\right)$.

Using the equation of the static Leontiev model (during period t, the tested model is static)[50,51,52,53] $S_i(t) = \sum_{j=1}^{n} s_{ij}(t) = \sum_{j=1}^{n} z_{ij}(X_j(t+1) - X_j(t))$

[49] Quoted in: T. Warowny, A. Surowiec, Quantitative… op. cit.

[50] C. Alpha Chiang, Foundations of mathematical economics, PWE, Warsaw 1994.

[51] C. Alpha Chiang, Elements of dynamic optimization, WSHiFM, Warsaw 2002.

[52] J. Growiec, Economic growth and technological progress, [in:] Sketches on the dynamics and stabilization of the economy, W. Pacho (ed.), SGH, Warsaw 2008, p. 43-85.

[53] G. Klima, Programowanie dynamiczne i modele rekursywne w ekonomii: zagadnienia analityczne i metody numeryczne z przykładowymi implementacjami w języku Matlab/Octave, „Materiały i studia / Zeszyt / Narodowy Bank Polski, Departament Analiz Makroekonomicznych i Strukturalnych" 2005; 201: 176.

$$(I-A)\bar{X}(t)=\bar{Y}(t)=\bar{S}(t)+\bar{C}(t)=Z\cdot\left(\bar{X}(t+1)-\bar{X}(t)\right)+\bar{C}(t)$$

We have: $Z^{-1}(I-A)\bar{X}(t)=\bar{X}(t+1)-\bar{X}(t)+Z^{-1}\bar{C}(t)$ i.e. the equation of the dynamic Leontiev model: $\bar{X}(t+1)=\left(Z^{-1}-Z^{-1}A+I\right)\bar{X}(t)-Z^{-1}\bar{C}(t)$.

Model solution – assume that the matrices A and Z are given and (I − A) and Z are non-singular. Let us also assume that the values of the initial pure final product $C^{-}(0)$ and the initial investment vector $S^{-}(0)$ are given, and therefore the size of the initial final product is given $Y^{-}(0) = S^{-}(0) + C^{-}(0)$. Then from the formula for solving the static Leontiev model: $S_i(t)=\sum_{j=1}^{n}s_{ij}(t)=\sum_{j=1}^{n}z_{ij}\left(X_j(t+1)-X_j(t)\right)$

We obtain: $X^{-}(0) = (I - A)-1\ Y^{-}(0)$. Using the equation: $\bar{X}(t+1)=\left(Z^{-1}-Z^{-1}A+I\right)\bar{X}(t)-Z^{-1}\bar{C}(t)$. We have: $\bar{X}(1)=\left(Z^{-1}-Z^{-1}A+I\right)\bar{X}(0)-Z^{-1}\bar{C}(0)$.

Now knowing the value of the global production vector $X^{-}(1)$ for the period t = 1, we can calculate the value of the final production vector for this period $Y^{-}(1) = (I - A)X^{-}(1)$.

At this point, we can again decide what part of the final product $Y^{-}(1)$ we will allocate to the investment $S^{-}(1)$, and what part will constitute the pure final product $C^{-}(1)$.

Please remember that: $Y^{-}(1) = S^{-}(1) + C^{-}(1)$, and that all vector coordinates $S^{-}(1)$ and $C^{-}(1)$ should be non-negative. Given the vectors $X^{-}(1)$ and $C^{-}(1)$, we can recalculate the value of the global product for the next period: $\bar{X}(2)=\left(Z^{-1}-Z^{-1}A+I\right)\bar{X}(1)-Z^{-1}\bar{C}(1)$.

Continuing this procedure, we generate a sequence of production vectors $\{\bar{X}(t)\}_{t=0}^{\infty}$. This sequence is called the economic development path. From a formal point of view, the solution of Leontiev's dynamic model is a sequence of global production vectors that is a solution of the equation: $\bar{X}(t+1)=\left(Z^{-1}-Z^{-1}A+I\right)\bar{X}(t)-Z^{-1}\bar{C}(t)$, with the initial condition $X^{-}(0) = X0$, where the vector $C^{-}(t)$ is defined for all t = 0, 1, ... The fact that the vector $C^{-}(t)$ is given in advance means that what part of the final product $Y^{-}(t)$ we spend on the investment $S^{-}(t) = Y^{-}(t)–C^{-}(t)$ for all t = 0.1, ... For the model to make economic sense it must be fulfilled the non-negativity condition of the vector $S^{-}(t)$, i.e. that: $C^{-}(t) \leq Y^{-}(t) = (I - A)X^{-}(t)$ for t = 0.1, ...

Economical dynamic models with discrete time

We have already dealt with the dynamic model when discussing Leontiev's model. Dynamic models are models in which variables are time-dependent. We will limit ourselves to the situation where time is a discrete time representing the number of the next period. As in the case of Leontiev's model, the model is static during each

period, and the change in variable values occurs after the transition to the next period. Such models are described using difference equations[54,55,56,57].

Spider web model – the model is a dynamic model with discrete time t = 0, 1, 2, ... We are considering the market of a certain, single good. The purpose of the model is to determine such a price path $\{P(t)\}_{t=0}^{\infty}$ for a given good so that demand completely meets supply for each period. Therefore, let t = 0, 1, 2, ... consecutive number of the period, Qs (t) supply for the good in period t (number of units of the good sought by the consumer in period t), Qd (t) demand for the good in period t (the number of units of the good supplied by producers in period t), and P (t) the price per unit of the good in period t.

Assumptions[58]:

1. The quantity demanded Qd (t) depends linearly on the price P (t) for the same period. The relationship is a decreasing function. We assume that Qd (t) ≥ 0.
2. The quantity of supply Qs (t) depends linearly on the price P (t − 1) from the previous period. Dependency is an increasing function. We assume that Qs (t) ≥ 0.
3. The linear nature of demand and supply is identical for each period in.
4. In each period, demand is completely balanced by supply.

Model equations:

- $Qd(t) = \alpha - \beta P(t)$
- $Qs(t) = -\gamma + \delta P(t-1)$
- $Qd(t) = Qs(t)$

for t = 1, 2, ..., where α, β, γ, δ > 0 (parameters).

Comments:

1. The situations described by the model occur in agriculture, where sowing precedes harvesting. The demand for a given product depends on the current price, but the supply, resulting from the size of sowing, is determined based on prices from the previous period.

2. For the equations to make economic sense, the conditions of non-negativity of the variables must be met. These conditions lead to the caveat that price path $\{P(t)\}_{t=0}^{\infty}$ should meet the condition:

$$\frac{\gamma}{\delta} \leq P(t) \leq \frac{\alpha}{\beta} \text{ for t = 0, 1, 2, ...}$$

In particular, a condition must be met $\frac{\gamma}{\delta} \leq \frac{\alpha}{\beta}$ or equivalently $\beta\gamma - \alpha\delta \leq 0$.

Parameter interpretation:

- α – maximum value of demand (at zero price),
- β – the marginal value of demand representing consumers' sensitivity to price changes,

[54] Quoted in: C. Alpha Chiang, Foundations… op. cit.

[55] C. Alpha Chiang, Elements… op. cit.

[56] J. Growiec, Economic growth… op. cit.

[57] G. Klima, Dynamic programming… op. cit.

[58] Quoted in: Warowny T., Surowiec A., Quantitative… op. cit.

- γ – a coefficient ensuring positive supply starting from a certain minimum price P1 ≥ 0,
- δ – the marginal value of supply representing producers' sensitivity to price changes.

Model solution – we are looking for the price path $\{P(t)\}_{t=0}^{\infty}$, i.e. a sequence satisfying the system: $Qd(t) = \alpha - \beta P(t)$; $Qs(t) = -\gamma + \delta P(t-1)$ and $Qd(t) = Qs(t)$.

Given the equilibrium equation: $Qd(t) = Qs(t)$ and given $Qd(t) = \alpha - \beta P(t)$ and $Qs(t) = -\gamma + \delta P(t-1)$, then $\alpha - \beta P(t) = -\gamma + \delta P(t-1)$, hence given the fact that $\beta \neq 0$, $P(t) = -\frac{\delta}{\beta} P(t-1) + \frac{\alpha+\gamma}{\beta}$.

It is a first-order linear non-homogeneous difference equation. The totality of solutions to the homogeneous equation is: $P_o(t) = c\left(-\frac{\delta}{\beta}\right)^t$, $t = 0, 1, 2, ...$, where c is an arbitrary constant. We are looking for a specific solution to the non-homogeneous equation among the constant solutions $Ps(t) = k$,

therefore

$$k = -\frac{\delta}{\beta}k + \frac{\alpha+\gamma}{\beta}$$

from where

because $\beta + \delta > 0$.

$$k = \frac{\alpha+\gamma}{\beta+\delta}$$

Hence, the totality of solutions to Eq $P(t) = -\frac{\delta}{\beta}P(t-1) + \frac{\alpha+\gamma}{\beta}$ is the form: $P(t) = c\left(-\frac{\delta}{\beta}\right)^t + \frac{\alpha+\gamma}{\beta+\delta}$, $t = 0, 1, 2, ...$ If we know the value of $P(0) = P0$, then $P(0) = c + \frac{\alpha+\gamma}{\beta+\delta}$.

Consequently, the solution to Eq $P(t) = -\frac{\delta}{\beta}P(t-1) + \frac{\alpha+\gamma}{\beta}$ with the initial condition $P(0) = P0$ is the price path $P(t) = \left(P_0 - \frac{\alpha+\gamma}{\beta+\delta}\right)\left(-\frac{\delta}{\beta}\right)^t + \frac{\alpha+\gamma}{\beta+\delta}$, $t = 0, 1, 2, ...$

For the solution to make economic sense, it must be assumed that P(t) satisfies the condition $P(t) = c\left(-\frac{\delta}{\beta}\right)^t + \frac{\alpha+\gamma}{\beta+\delta}$, $t = 0, 1, 2, ...$

You should at least make sure that $\frac{\gamma}{\delta} \leq P_0 \leq \frac{\alpha}{\beta}$.

Properties of the price path[59]: if $P_0 = \frac{\alpha+\gamma}{\beta+d}$, this $P(t) = \frac{\alpha+\gamma}{\beta+d}$. We are then dealing with a permanent solution. Note that the condition $\beta\gamma - \alpha\delta \leq 0$ implies that $\frac{\gamma}{\delta} \leq P(t) \leq \frac{\alpha}{\beta}$ for $t = 0, 1, 2, ...$ Z. Let's assume that $P_0 > \frac{\alpha+\gamma}{\beta+\delta}$ (due to economic reasons, this situation cannot arise $P_0 < \frac{\alpha+\gamma}{\beta+d}$. Let's consider three cases.

[59] Quoted in: T. Warowny, A. Surowiec, Quantitative… op. cit.

Functions and their properties

Flinear function. The linear function of one variable x has the form: y = f(x) = ax + b, where a is called the slope coefficient and ab is called the intercept. This function is increasing when a > 0, constant when a = 0 and decreasing when a < 0. A linear function of m variables has the form: f (x1, x2, ..., xm) = a0 +a1x1 +a2x2 + ...+amxm, ai ≠ 0, i = 1, 2, ..., m. In particular, for m = 2 we get f(x1,x2) = a0 + a1x1 + a2x2[60].

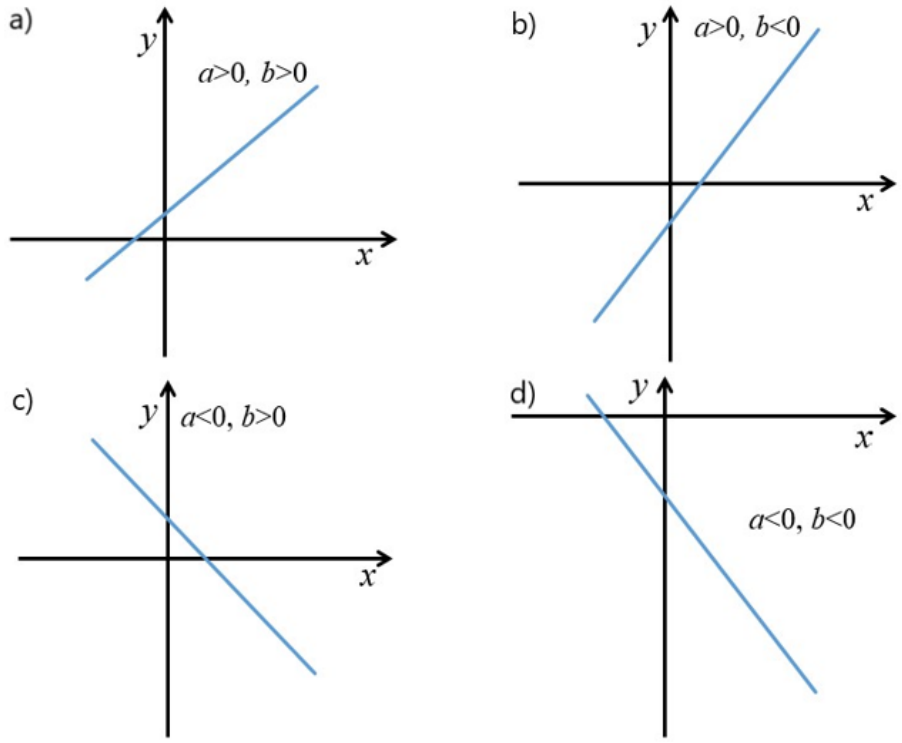


Figure 2. Graphs of linear functions of one variable

Source: T. Warowny, A. Surowiec, Quantitative market analysis, Lublin University of Technology, Lublin 2019, p. 140

Nonlinear functions – a polynomial function of degree m has the form f(x) = a0 + a1x + a2x2 + ... + amxm, am ≠ 0 when m = 0: f(x) = a0 (constant function); when m = 1: f(x) = a0 + a1x (linear function); when m = 2: f(x) = a0 + a1x + a2x2 (quadratic function), etc. The mth degree polynomial has at most m real zeros and at most m−1 extrema. For am > 0 there is limx→∞ f(x) = ∞, and for am < 0 there is limx→∞ f(x) = −∞.

[60] Ibidem.

A quadratic function is often written in the form: y = ax2 + bx + c, a ≠ 0. The graph of a quadratic function is a parabola pointing upwards when a > 0 or downwards when a < 0. Depending on the sign, Δ = b2 − 4ac quadratic function has two zeros when Δ > 0, which are equal $x_1 = \frac{-b-\sqrt{\Delta}}{2a}$, $x_2 = \frac{-b+\sqrt{\Delta}}{2a}$, has one zero place when Δ = 0 is equal $x_{1,2} = \frac{-b}{2a}$ and there are no zeros when Δ < 0[61,62,63].

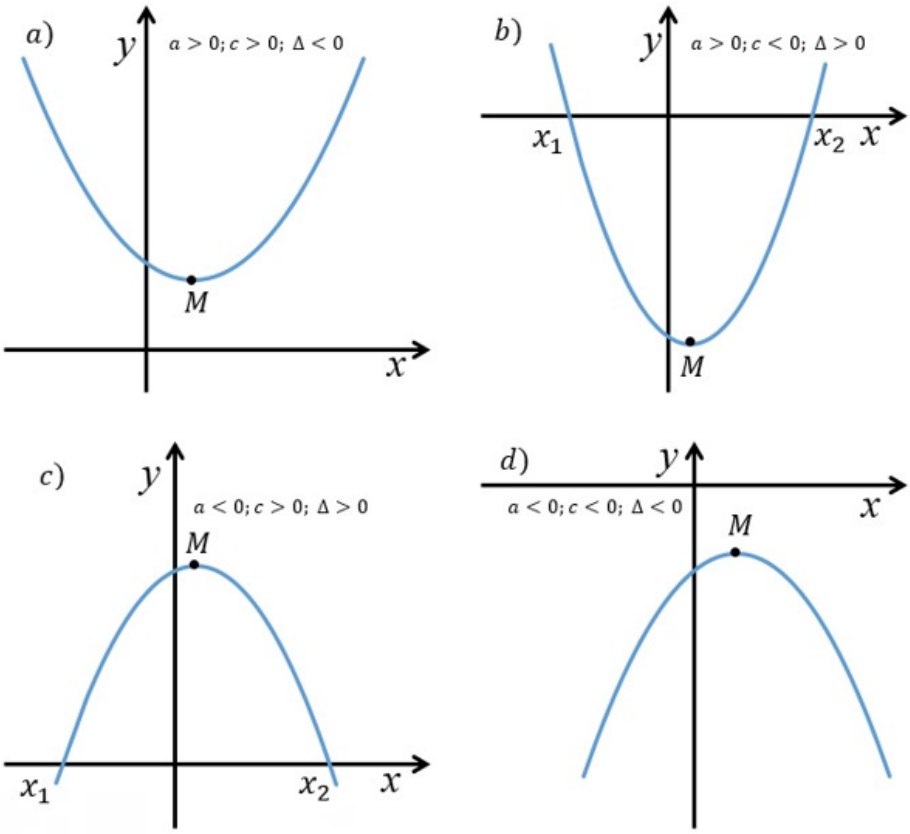


Figure 3. Graphs of quadratic functions

Source: T. Warowny, A. Surowiec, Quantitative market analysis, Lublin University of Technology, Lublin 2019, p. 142

Let us denote the coordinates of the vertex of the parabola by (p, q). Then $p = \frac{-b}{2a}$, $q = \frac{-\Delta}{4a}$. The quadratic function reaches its extreme at point p. The value of the extreme is q. It is the minimum of the function when a > 0 and the maximum when a < 0.

[61] B. Gawronska-Nowak, G. Walerysiak, Economic decisions. Quantitative approach, PWE, Warsaw 2005.

[62] R. Głowacki, J. Kramer, L. Babinski, Market analysis, PWE, Warsaw 1981.

[63] M. Gruszczynski, M. Podgórska, Econometrics ... op. cit.

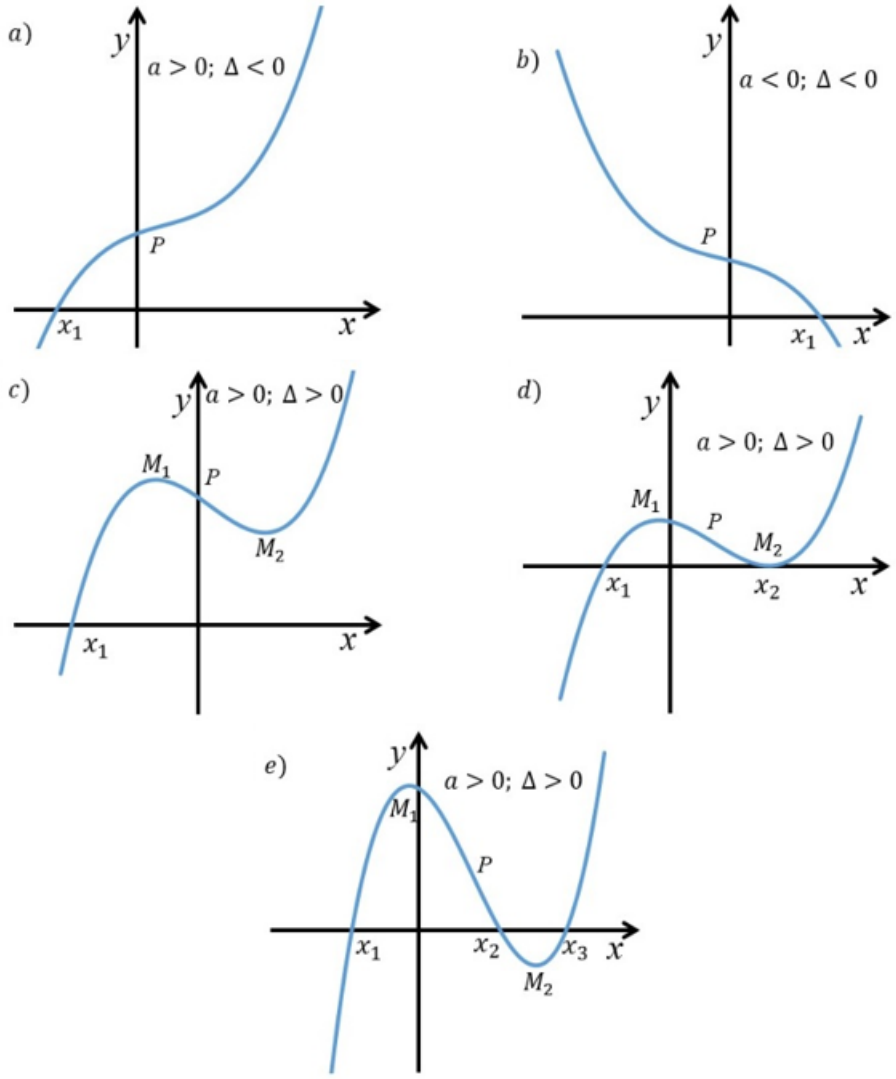


Figure 4. Graphs of cubic functions

Source: T. Warowny, A. Surowiec, Quantitative market analysis, Lublin University of Technology, Lublin 2019, p. 143

The cubic function has the form y = ax3 + bx2 + cx + d, and 6= 0. The graph of the cubic function is a cubic parabola, the shape of which depends on the signs of the parameter a and the value Δ = b2 −3ac. If Δ ≤ 0, the function is increasing when a > 0 and decreasing when a < 0.

If $\Delta > 0$, then the cubic function has two extrema at points M1 and M2, then:

$$M_1\left(-\frac{b+\sqrt{\Delta}}{3a},\quad d+\frac{2b^3-9abc-(6ac-2b^2)\sqrt{\Delta}}{27a^2}\right)$$

$$M_2\left(-\frac{b-\sqrt{\Delta}}{3a},\quad d+\frac{2b^3-9abc+(6ac-2b^2)\sqrt{\Delta}}{27a^2}\right),$$

A cubic function can have one, two or three zeros.

A cubic curve has an inflection point $P=(-\frac{b}{3a},\frac{2b^3-9abc}{27a^2}+d)$ and intersects the y axis at the point with coordinates (0, d).

Törnquist functions. There are four types of Törnquist functions depending on the type of consumer good or service:

Zero-type Törnquist function T_0: $y=\frac{a(x-c)}{x+b}$, $a, c>0$, $b<-c$, $0\le x\le c$ or $x>-b$.

Törnquist function of the first type T_1: $y=\frac{ax}{x+b}$, $a, b>0$, $x\ge 0$.

Törnquist function of the second type T_2: $y=\frac{a(x-c)}{x+b}$, $a, c, b>0$, $x\ge c$.

Törnquist function of the third type . T_3: $y=\frac{ax(x-c)}{x+b}$, $a, c, b>0$, $x\ge c$.

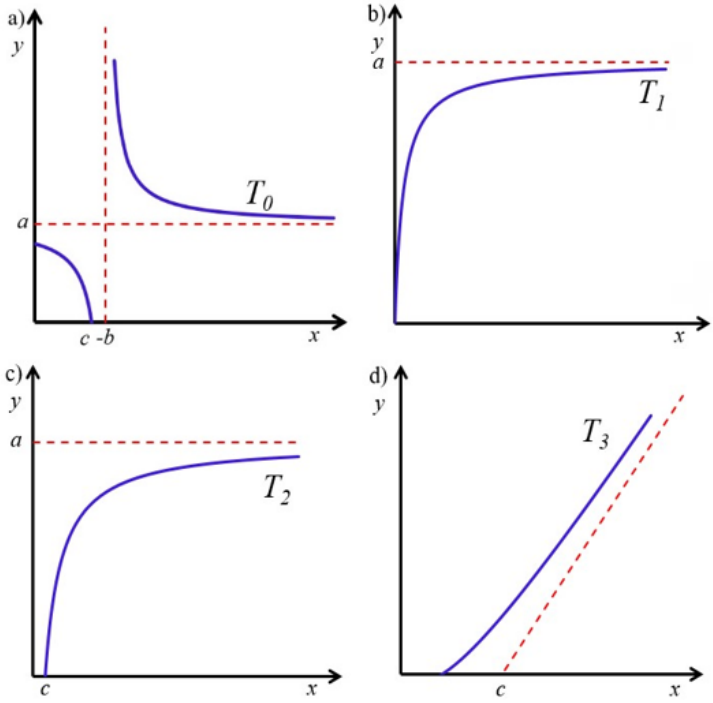


Figure 5. Graphs of Törnquist functions

Source: T. Warowny, A. Surowiec, Quantitative market analysis, Lublin University of Technology, Lublin 2019, pp. 143-145

It can be said that[64,65,66,67,68,69,70,71]:

- The Törnquist function of type 0, in the interval [0,c] is strictly concave, in the interval (–b, ∞) it is strictly convex, in the interval [0,c] it decreases more and more rapidly, and in the interval (–b, ∞) it decreases more and more slowly.
- The Törnquist function type 1 is strictly concave in the interval [0, ∞) and grows more and more slowly.
- The Törnquist function type 2 is strictly concave in the interval [c, ∞) and grows more and more slowly.
- The type 3 Törnquist function is strictly convex in the interval [c, ∞) and grows faster and faster.

The power function is of the form f(x) = axb, a > 0.

If b = 1 then f(x) is a function $E_f(x) = \frac{x}{f(x)} f'(x)$ linear (y = ax).

If b = –1 then f(x) is a hyperbolic function $(y = \frac{a}{x})$. It is worth noting that the power function is characterized by constant elasticity. If x > 0 if(x) > 0 and f(x) = axb and then $E_f(x) = x\frac{abx^{b-1}}{ax^b} = b$.

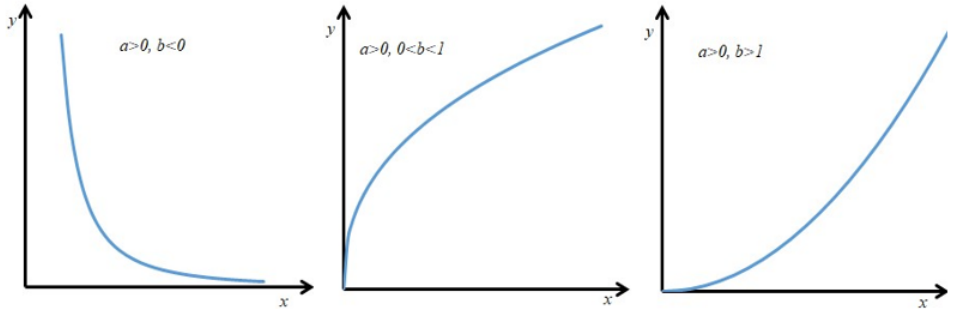


Figure 6. Power function graphs with different values of parameters a, b
Source: own study

A power function of many variables has the form $f(x_1, x_2, ..., x_m) = \alpha_0 x_1^{\alpha_1} x_2^{\alpha_2} ... x_m^{\alpha_m}, \quad \alpha_0 \neq 0$.

[64] Based on: H. Mruk, Market Analysis, PWE, Warsaw 2003.
[65] S. Mynarski, Market analysis. Problems and methods, PWN, Warsaw 1987.
[66] M. Nasiłowski, Market system. Fundamentals of micro- and macroeconomics, Key Text Publishing House, Warsaw 2010.
[67] E. Nowak, Decision-making cost accounting, PWN, Warsaw 1994.
[68] M. Osinska, Contemporary econometrics, Dom Organizatora, Toruń 2007.
[69] S. Owsiak, Fundamentals of finance, PWE, Warsaw 2011.
[70] W. Rzymowski, Econometrics in examples and tasks, KAPRINT, Lublin 1999.
[71] W. Samuelson, Managerial economics, Polish Economic Publishing House, Warsaw 2009.

In the special case when m = 2, we obtain a power function of two variables $f(x_1, x_2) = \alpha_0 x_1^{\alpha_1} x_2^{\alpha_2}$.

It is easy to prove that for every i = 1,2,...m there is: $E_{f,x_i} = \frac{x_i}{f(x_1, x_2, ..., x_m)} \frac{\partial f(x_1, x_2, ..., x_m)}{\partial x_i} = \alpha_i$, which means that a power function of many variables has elasticity constants with respect to each of the variables xi, i = 1, 2 ,..., m. A very important property of this function is homogeneity.

It consists in the fact that for any number n > 0 the equality holds: *f*(nx1, nx2, ..., nxm) = nα1 + α2 + ... + αmf (x1, x2, ..., xm).

The exponential function of one variable has the form T(x) = abx = aecx, b > 0, *b*≠ 1, b = ec.

If b = 1 then y = a is a constant function.

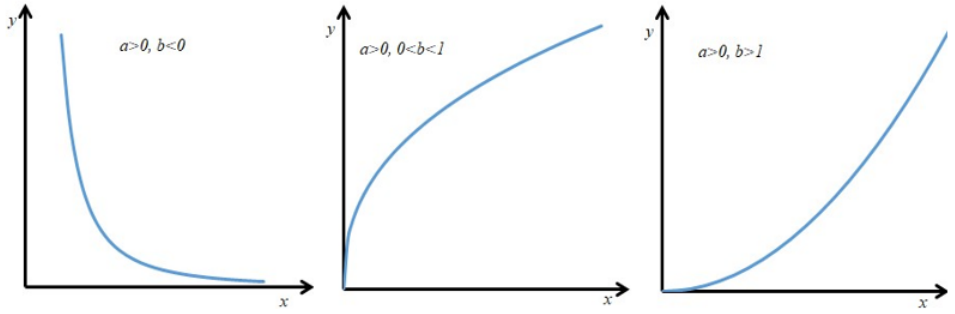


Figure 7. Graphs of the exponential function for different values of parameter b
Source: own study

It is worth noting that the elasticity function for the exponential function is linear.

Reducing a polynomial function of degree m to linear form. In the equation: f(x) = a0 + a1x + a2x2 + ... + amxm, where am ≠ 0, let's use the following substitutions: x = x1, x2 = x2, x^3 = x3, ... *xm* = xm. Then the function y = a0 + a1x + a2x2 + ... amxm will take the form: y = a0 + a1x1 + a2x2 + ...amxm.

Reducing hyperbolic functions to linear form. In Eq$y = \frac{a}{x}$we can use substitution $\tilde{x} = \frac{1}{x}$. Then the function $y = \frac{a}{x}$will take the linear form y = ax˜. To bring this equation into a linear form, let us consider the inverses of both sides of this equation, obtaining: $\frac{1}{y} = \frac{1+bx}{a} = \frac{1}{a} + \frac{b}{a}x$.

Substituting appropriately: $\tilde{y} = \frac{1}{y}$, $\tilde{a} = \frac{1}{a}$, $\tilde{c} = \frac{b}{a}$, we get a linear form: y˜ = a˜ + cx˜ , where $a = \frac{1}{\tilde{a}}$, $b = \frac{\tilde{c}}{\tilde{a}}$.

Reducing the Törnquist function to linear form can be reduced to linear form in two ways. Method 1. Consider the inverses of both sides of the equation $T_1: \quad y = \frac{ax}{x+b}, \quad a, b > 0, \quad x \geq 0.$

Proceeding similarly to functions $y = \frac{a}{1+bx}$, we receive $\frac{1}{y} = \frac{x+b}{ax} = \frac{1}{a} + \frac{b}{a}\frac{1}{x}$.

Substituting appropriately $\tilde{y} = \frac{1}{y}$, $\tilde{x} = \frac{1}{x}$, $\tilde{a} = \frac{1}{a}$, $\tilde{c} = \frac{b}{a}$, we get the linear form y˜ = a˜ + c˜x˜, where $a = \frac{1}{\tilde{a}}$, $b = \frac{\tilde{c}}{\tilde{a}}$.

Method 2 – multiplying both sides of the equation $T_1: \quad y = \frac{ax}{x+b}$, $a, b > 0, \quad x \geq 0$ by x+b we get: *xy*+ by = ax or *xy*= ax − by.

Substituting xy = zi − b = β, we obtain a linear model with two explanatory variables, without an intercept of the form z = ax + βy.

To the Törnquist function $T_2: \quad y = \frac{a(x-c)}{x+b}, \quad a, c, b > 0, \quad x \geq c$

To make it linear, both sides of this equation must be multiplied by the denominator, which gives yx + yb = ax − ac. After dividing both sides of the equation by bi and rearranging the terms, we obtain the linear form y = β0 + β1x + β2z, where: $z = yx$, $\beta_0 = -\frac{ac}{b}$, $\beta_1 = \frac{a}{b}$, $\beta_2 = -\frac{1}{b}$, that is: $a = -\frac{\beta_1}{\beta_2}$, $b = -\frac{1}{\beta_2}$, $c = -\frac{\beta_0}{\beta_1}$.

To make a Törnquist function of the third type $T_3: \quad y = \frac{ax(x-c)}{x+b}$, $a, c, b > 0, \quad x \geq c$

To achieve a linear form, we proceed similarly to the second type of Törnquist function by multiplying both sides of this equation by the denominator, which gives: *yx*+ yb = ax2 − acx.

After dividing both sides of the equation by bx and rearranging the terms, we obtain the linear form = β0 + β1x + β2y, where: $z = \frac{y}{x}$, $\beta_0 = -\frac{ac}{b}$, $\beta_1 = \frac{a}{b}$, $\beta_2 = -\frac{1}{b}$, that is $a = -\frac{\beta_1}{\beta_2}$, $b = -\frac{1}{\beta_2}$, $c = -\frac{\beta_0}{\beta_1}$.

Reducing the power function to linear form. To make a power function of one variable: f(x) = axb, a > 0. To bring this equation into a linear form, this equation must be logarithmed on both sides, e.g. using the logarithm with base e, which gives lny = ln(axb).

Using the properties of the logarithm lnαβ = β lnα and ln(αβ) = lnα + lnβ, we obtain lny = lna + blnx. Substituting y˜ = lny, x˜ = lnx, a˜ = lna into the equation, respectively, we obtain the linear form y˜ = a˜ + bx˜, where a = exp(a˜).

Applying a power function of two variables $f(x_1, x_2) = \alpha_0 x_1^{\alpha_1} x_2^{\alpha_2}$ to a linear form requires, as in the case of a power function of one variable, two-sided logarithmization $\ln y = \ln(a_0 x_1^{a_1} x_2^{a_2})$, which gives: lny = lna0 + a1 lnx1 + a2 lnx2, or y˜ = a˜0 + a1x˜1 + a2x˜2, where: *y*˜ = lny, x˜1 = lnx1, x˜2 = lnx2, a˜0 = lna0, a0 = exp(a˜0).

In the case of a power function of many variables $f(x_1, x_2, ..., x_m) = \alpha_0 x_1^{\alpha_1} x_2^{\alpha_2} ... x_m^{\alpha_m}, \quad \alpha_0 \neq 0$ proceed in the same way as in the case of a power function of one or two variables. The following equation is then obtained $\ln y = \ln(a_0 x_1^{a_1} x_2^{a_2} ... x_m^{a_m}) = \ln a_0 + a_1 \ln x_1 + a_2 \ln x_2 + ... + a_m \ln x_m$, i.e. the appropriate linear form: *y*˜ = a˜0 + a1x˜1 + a2x˜2 + ... + amx˜m, where: y˜ = lny, x˜1 = lnx1, x˜2 = lnx2, ..., x˜m = lnxm a˜0 = lna0, a0 = exp(a˜0).

To go from the exponential form to the linear form, the equation $f(x) = abx = aecx$, $b > 0$, $b \neq 1$, must be logarithmized on both sides, $b = ec$, e.g. using the natural logarithm, and using the properties $\ln\alpha\beta = \beta \ln\alpha$ and $\ln(\alpha\beta) = \ln\alpha + \ln\beta$, we obtain $\ln y = \ln(abx)$, i.e. $\ln y = \ln a + x\ln b$. Substituting $y\tilde{} = \ln y$, $a\tilde{} = \ln a$, $\tilde{}b = \ln b$ in the equation $\ln y = \ln a + x\ln b$ gives the linear form $y\tilde{} = a\tilde{} + \tilde{}bx$. The parameters a and b are $a = \exp(a\tilde{})$ and $b = \exp(\tilde{}b)$, respectively. ($\tilde{}b = c$ in the equation $f(x) = abx = aecx$, where $b > 0$, $b \neq 1$, $b = ec$).

Conclusions

Quantitative methods make it possible to carry out analyses of socio-economic phenomena, thus supporting decision-making and objective grading of the existing situation. In addition, they make it possible to recognise the mechanisms of functioning of economic systems, identify the existing determinants of economic phenomena, as well as predict the effects of actions taken and changes in the processes under study. They thus create the premises for determining future socio-economic development. Quantitative methods are also used to verify economic theories and even circulating views and opinions. The application of quantitative methods in the broader economic sciences enables proper planning and organisation of economic activities at various levels.

Bibliograhpy

Alpha Chiang C., Elements of dynamic optimization, WSHiFM, Warsaw 2002.

Alpha Chiang C., Foundations of mathematical economics, PWE, Warsaw 1994.

Bednarski T., Elements of mathematics in economic sciences, Oficyna Ekonomiczna, Warsaw 2004.

Bego D., Fischer S., Dorenbusch R., Microeconomics, PWE, Warsaw 2007.

Bergstrom T. C., Varian H. R., Microeconomics – exercises, PWN, Warsaw 2003.

Black J., Dictionary of Economics, PWN, Warsaw 2008.

Bremond J., Couet J. F., Salort M. M., Compendium of knowledge about economics, PWN, Warsaw 2005.

Collective work, Company management. Strategies, structures, decisions, identity, PWE, Warsaw 2007.

Curtis D., Irvine I., Macroeconomics Theory, Models & Policy, Lyryx 2017.

Dornbush R., Fischer S., Macroeconomics, McGraw-Hill Publishing Company, New York 1987.

Gawronska-Nowak B., Walerysiak G., Economic decisions. Quantitative approach, PWE, Warsaw 2005.

Gerber H. U., Life insurance mathematics, Springer-Verlag, Berlin 1990.

Głowacki R., Kramer J., Babinski L., Market analysis, PWE, Warsaw 1981.

Górka J., Orzeszko W., Wata W., Mathematical economics: materials for exercises, C.H. Beck Publishing House, Warsaw 2009.

Greenlaw S. A., Shapiro D., Karpa W., Maszczyk P., Microeconomics – basics, OpenStax Poland, Warsaw 2022.

Growiec J., Economic growth and technological progress, [in:] Sketches on the dynamics and stabilization of the economy, Pacho W. (ed.), SGH, Warsaw 2008.

Gruszczyński M., Podgórska M., Econometrics, SGH, Warsaw 2004.

Kanas S., Fundamentals of mathematical economics, PWN, Warsaw 2011.

Klein L. R., Lectures on econometrics, North-Holland, Amsterdam 1983.

Klima G., Programowanie dynamiczne i modele rekursywne w ekonomii: zagadnienia analityczne i metody numeryczne z przykładowymi implementacjami w języku Matlab/Octave, „Materiały i studia / Zeszyt / Narodowy Bank Polski, Departament Analiz Makroekonomicznych i Strukturalnych" 2005; 201: 176.

Kłosowski G., The use of computer simulation in controlling the furniture production flow, "Enterprise Management" 2011; 2: 29-37.

Koliński A., Śliwczyński B., Golińska-Dawson P., The use of simulation as a tool supporting the process of assessing production efficiency in manufacturing enterprises, "e-mentor" 2018; 3(75): 80-90.

Kordzikowski H., Life insurance contract, Faktor, Wrocław 1999.

Kulapa W., Mathematical aspects of economics, Cardinal Stefan Wyszyński University Publishing House, Warsaw 2008.

Maciąg A., Forecastingand simulation in the enterprise, PWE, Warsaw 2013.

Mruk H., Market Analysis, PWE, Warsaw 2003.

Mynarski S., Market analysis. Problems and methods, PWN, Warsaw 1987.

Nasiłowski M., Market system. Fundamentals of micro- and macroeconomics, Key Text Publishing House, Warsaw 2010.

Nowak E., Decision-making cost accounting, PWN, Warsaw 1994.

Osinska M., Contemporary econometrics, Dom Organizatora, Toruń 2007.

Owsiak S., Fundamentals of finance, PWE, Warsaw 2011.

Panek E., Mathematical economics, AE in Poznań, Poznań 2003.

Panek E., Fundamentals of mathematical economics. Materials for exercises, AE in Poznań, Poznań 2002.

Pawlak M., Symulacja Monte Carlo w analizie ryzyka projektów inwestycyjnych, „Zeszyty Naukowe Uniwersytetu Szczecińskiego. Finanse, Rynki Finansowe, Ubezpieczenia" 2012; 51: 83-94.

Pawłowski Z., Elements of econometrics – textbook, PWN, Warsaw 1981.

Porter M. E., Competitive Strategy, PWE, Warsaw 1992.

Rekowski M., Introduction to microeconomics, Polsoft-Akademia, Poznań 1994.

Rommer D., Macroeconomicsfor advanced, PWN, Warsaw 2000.

Ronka-Chmielowiec W., Risk in insurance - assessment methods, AE, Wrocław 1997.

Rzymowski W., Econometrics in examples and tasks, KAPRINT, Lublin 1999.

Samuelson W., Managerial economics, Polish Economic Publishing House, Warsaw 2009.

Samuelson P. A., Nordhaus W. D., Economics, PWN, Warszawa 2004.

Sangowski T., Business insurance, Poltext, Warsaw 1998.

Tokarski T., Mathematical economics. Macroeconomic models, PWE, Warsaw 2011.

Tokarski T., Mathematical economics. Microeconomic models, WNT, Warszawa 2011.

Urbanowska-Sojkin E., Banaszyk P., Witczak H., Strategic management of the enterprise, PWE, Warsaw 2017.

Warowny T., Surowiec A., Quantitative market analysis, Lublin University of Technology, Lublin 2019.

Fundamentals of Mathematical Economics. Online: https://docplayer.pl/56946316-1-zastosowanie-rachunku-ro-niczkowy-i-caakowy-w-ekonomii.html.

http://qmamfinanse.pl/rachunek-kosztow/metody-kalkulu-kosztow/.

https://edu.pjwstk.edu.pl/wyklady/poz/scb/index39.html.

*Bohdan Samoilenko**
*Liubov Starodubtseva***
*Tetiana Dluhopolska****

MECHANISMS FOR ENSURING STATE REGULATION OF THE LOGISTICS SERVICES MARKET IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

Mechanizmy zapewniające państwową regulację rynku usług logistycznych w kontekście zrównoważonego rozwoju

*PhD., Lesya Ukrainka Volyn National University, ORCID: 0009-0006-2380-314X
**Lesya Ukrainka Volyn National University, ORCID: 0009-0000-5998-6714
***PhD., West Ukrainian National University, ORCID: 0000-0003-1925-963X

Streszczenie

Sektor logistyczny jest jednym z kluczowych elementów gospodarki, który ma znaczący wpływ na produktywność, dystrybucję towarów i usług oraz ogólną konkurencyjność kraju. W Ukrainie, podobnie jak w wielu innych krajach, obserwuje się stały wzrost popytu na usługi logistyczne, napędzany zarówno przez czynniki wewnętrzne, jak i zewnętrzne. Aby jednak rynek ten funkcjonował efektywnie, potrzebne są jasne i przejrzyste państwowe mechanizmy regulacyjne, które zapewnią równowagę między interesami państwa, biznesu i konsumentów. Obecna państwowa regulacja rynku usług logistycznych w Ukrainie boryka się z takimi problemami, jak niedoskonałe ramy prawne, niewystarczające wsparcie instytucjonalne, brak przejrzystości i słaba koordynacja z innymi sektorami. W związku z tym proponuje się rozważenie pewnych aspektów, które przyczynią się do bardziej skutecznej regulacji rynku usług logistycznych.

Słowa kluczowe: *mechanizmy wsparcia, regulacje państwowe, rynek usług logistycznych, zrównoważony rozwój, procesy regulacyjne*

Summary

The logistics sector is one of the critical elements of the economy, which significantly influences productivity, distribution of goods and services, and the country's overall competitiveness. In Ukraine, as well as in many other countries, there is a steady growth in the demand for logistics services driven by internal and external factors. However, for this market to function efficiently, clear, and transparent state

regulatory mechanisms must balance interests between the state, business, and consumers. The current state regulation of the logistics services market in Ukraine has such problems as an imperfect legal framework, insufficient institutional support, lack of transparency, and poor coordination with other sectors. Therefore, it is proposed that a collaborative approach be adopted to consider certain aspects that will contribute to more effective regulation of the logistics market, ensuring that all stakeholders' voices are heard and their interests are taken into account.

Key words: support mechanisms, state regulation, logistics services market, sustainable development, regulatory processes

Introduction

The logistics services market is a vital sector of the economy that plays a pivotal role in the efficiency of the production and distribution of goods and services, as well as the overall competitiveness of the national economy. In Ukraine, as in many other countries, there is a steady upward trend in demand for logistics services driven by both internal and external factors, underscoring its significance.

For the efficient functioning of the logistics services market, it is imperative to establish clear and transparent government regulation mechanisms. These mechanisms, by ensuring a balance between the interests of the state, business, and consumers, will provide a sense of security and confidence in the proposed changes.

Given the existing challenges, we propose certain aspects of effective state regulation of the logistics services market. This proposal, with its comprehensive solutions, aims to address the imperfect regulatory framework, institutional insufficiency, lack of transparency, and weak coordination with other industries, instilling a sense of hope and optimism about the future of the market.

Ukraine has several legal acts regulating the logistics activities, but they often need to be more cohesive, contain contradictions, and be updated to reflect the current challenges. The absence of a single government agency responsible for the comprehensive logistics regulation leads to a dispersion of powers and complicates the coordination of actions of various government agencies. Decision-making processes for regulating the logistics services market are often non-transparent, which limits public and business participation in the process of policymaking. The regulation of logistics is not sufficiently coordinated with the regulation of other economic sectors, making it difficult to solve complex problems.

The state regulation of the logistics services market in Ukraine faces several problems and challenges that hinder the development of logistics infrastructure and reduce the competitiveness of the national economy. Limited state budget resources lead to underinvestment in the infrastructure, lack of modern equipment and software, and insufficient support for the research. This, in turn, reduces the efficiency of the logistics processes and increases their cost. Widespread corruption schemes in the logistics sector lead to inefficient use of budget funds, impede competition, and

create additional barriers to business. Insufficient integration into global logistics networks limits Ukraine's export potential and reduces its competitiveness on the global market. The lack of a clear division of powers and coordination between central executive authorities and local governments complicates the implementation of state policy in the logistics sector. Complicated and unclear procedures for obtaining permits and frequent changes in legislation create additional barriers and reduce the industry's investment attractiveness. The lack of the qualified personnel in the logistics sector hinders the introduction of new technologies and the efficiency of logistics processes. Lagging behind global trends in the digital transformation of logistics, the need for a single state platform for information exchange and the low level of process automation contribute to the insufficient regulation of the logistics services market[1].

To this end, we offer the author's vision of effective state regulation of the logistics services market, which will be one of the mechanisms to ensure it from the point of view of the strategic priorities and the expected systemic changes (figure 1).

[1] H. Pavlova, I. Babii, D. Volovik, Establishment Of Logistics At The Level Of International Economic Relations, "Innovation and Sustainability" 2022; 2: 139–146.

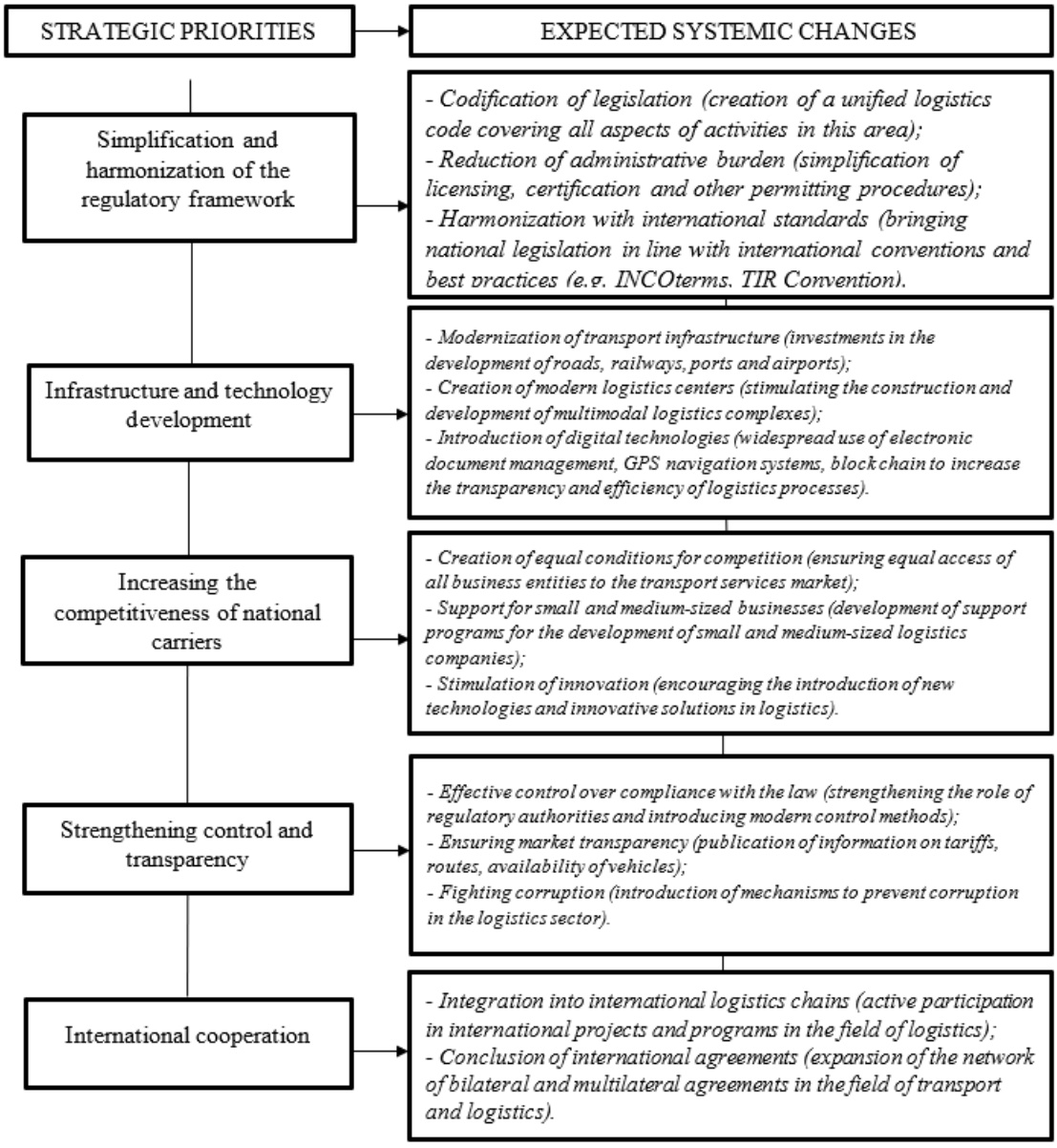


Figure 1. Effective state regulation of the logistics services market
Source: compiled by the authors

Literature review

The history of the emergence of logistics has been studied by a large number of both domestic and foreign scholars; some of them are: Babiy I.V., Volovyk D.V., Pavlova G.E., Kharsun L., Dychkovskyi R.[2,3,4,5,6].

At the same time, the issues of institutionalism and regulatory processes in the logistics sector were the focus of the works of Novosad O.V., Pavlova O.V., Pavlova M.M. Novosad O., Pavlov K., Pavlova O., Pinchuk A., Serhiychuk O., Wołowiec T., Zaichuk K.[7,8,9,10,11].

In our opinion, insufficient attention has been paid to a comprehensive approach to studying the institutional framework for regulating the logistics services market in the country and its regions.

Methods

The efficient functioning of the logistics services market within the overall macroeconomic system requires a comprehensive analysis and synthesis of the logistics processes at different levels of management. This implies the development of a comprehensive methodology based on a solid foundation of logistics concepts. Despite significant achievements in the scientific apparatus of logistics, there are still disagreements about understanding its essence and role in shaping the institutional environment.

---

[2] K. Pavlov, O. Pavlova, L. Ilyin et all, Assessment of Innovation and Investment Attractiveness of the Western Ukrainian Regional Market of Tourist Services, "ECONOMICS" 2023; 11(1): 45-68.

[3] O. M. Pavlova, O. V. Novosad, A. V. Murzina et all, Development of entrepreneurship in the field of IT business in the conditions of change and communication, "Actual problems of innovative economy and law" 2024; 2: 124-130.

[4] M. Kononenko, O. Khomanko, E. Cabana et all, Using the methods to calculate parameters of drilling and +blasting operations for emulsion explosives, "Acta Montanistica Slovaca" 2023; 28(v28/i3), 655–667.

[5] M. Kononenko, O. Khomenko, I. Kovalenko et all, Determining the performance of explosives for blasting management, "Rudarsko-Geološko-Naftni Zbornik" 2023; 38(3): 19–28.

[6] K. Pavlov, O. Pavlova, T. Kotsko et all, Functioning efficiency of the electricity market of the western region of Ukraine, "Polityka Energetyczna – Energy Policy Journal" 2023; 26(2), 47-64.

[7] O. M. Pavlova, Human capital development in the context of European integration changes and economic challenges, "International scientific journal "Internauka"" 2024; 6: 1-17.

[8] O. M. Pavlova, K. V. Pavlov, Logistics interaction between the subjects of the gas transportation industry: implementation mechanism and prospects, "International scientific journal "Internauka"" 2020; 3(35): 46-51.

[9] T. Wołowiec, K. Pavlov, O. Pavlova, K. Zaichuk, Tourist Services of the Western Region of Ukraine: Rating and Analysis, "ECONOMICS" 2022; 10(1): 183-198.

[10] O. M. Pavlova, O. V. Novosad, A. V. Murzina et all, Development of entrepreneurship in the… op. cit.

[11] O.M. Pavlova, K. Pavlov, A. Bortnik et all, Methodological Approaches to Project Evaluation in Business, Logistics and Trade, "Deleted Journal" 2024; 4(4): 1-15.

Results

An analysis of the state regulation of the logistics services market in Ukraine has revealed several problems that hinder the development of this industry. To improve the efficiency of the logistics system, systemic changes are required:

1. Improvement of the regulatory framework, i.e. codification of legislation, reduction of administrative burden, and harmonization with international standards.
2. Modernization of the infrastructure will be carried out based on the development of the transport network, the creation of modern logistics centers, and the introduction of digital technologies.
3. Creating a favorable business environment by ensuring the equal conditions for competition, supporting small and medium-sized businesses, and stimulating innovation.
4. Strengthening control and transparency in the context of effective control over compliance with the law, ensuring market transparency and fighting corruption.
5. International cooperation, including integration into international logistics chains and the conclusion of international agreements, offers a potential for a more promising future for the Ukrainian logistics industry.

Codification of legislation in the field of logistics is the process of systematizing and unifying all legal acts regulating activities in this area into a single code. Such an approach is one of the most effective ways to simplify and harmonize the regulatory framework, which, in turn, contributes to the development of the logistics business and increases its transparency.

The expediency of codification lies in that a single code with clear and understandable wording greatly simplifies the procedures for obtaining permits, accounting, and reporting for business entities. Eliminating duplication of norms and contradictions in different legal acts reduces bureaucratic barriers and shortens the time for paperwork. Clearly defined market rules allow the businesses to plan their activities more efficiently and reduce the risks associated with unexpected changes in legislation[12].

The development of a logistics code is a complex and lengthy process that requires the involvement of a wide range of stakeholders. Each participant, from the government officials to the logistics experts, is instrumental in shaping the future of the industry.

The implementation of codification requires joint efforts from the state, the businesses, and the expert community. It is essential to ensure the broad engagement of all stakeholders to develop an effective and balanced logistics code. Each participant's contribution is essential, as codification of logistics legislation is a technical task and an essential tool for modernizing Ukraine's economy and integrating it into global economic processes.

[12] Z. Siryk, O. Hrafska, K. Pavlov, B. Samoilenko, R. Chornyi, Sustainable development trends in the Ukrainian logistics market, "E3S Web Conf." 2024; 567: 1-11.

One of the critical challenges Ukrainian businesses encounters, especially in the logistics sector, is the excessive administrative burden. The multiplicity of laws, regulations, different interpretations, and constant changes in the regulatory environment create significant difficulties for entrepreneurs. Reducing the number of permits will make it possible to cancel the unnecessary permits (the ones that are not justified or duplicate the other ones); the transition to the declarative principle will replace some permitting procedures, because of which a business entity will independently declare compliance with the requirements of the law. The optimization of permitting procedures will reduce the time required for their consideration and the number of required documents[13].

Harmonization with the international standards is a pivotal strategic priority for Ukraine. This will involve bringing the national legislation in line with the international conventions and best practices in the field of logistics (e.g. INCOterms, TIR Convention). Specific measures may include adopting these international standards into the Ukrainian law and providing training and support to businesses to ensure compliance. This will facilitate international trade and increase the competitiveness of Ukrainian exporters.

Modernization of the transport infrastructure, creation of modern logistics centers, and introduction of digital technologies are critical factors in developing the infrastructure and technology in Ukraine. These measures are closely interconnected and create a synergistic effect that contributes to increased transportation efficiency, reduced logistics costs, and increased competitiveness of the Ukrainian economy. In particular, we see the expediency of modernizing the transport infrastructure in increasing the speed and efficiency of transportation, which will reduce the delivery time of goods and passengers and the logistics costs.

However, Russia's full-scale invasion of Ukraine has significantly changed the country's logistics processes. The blockade of seaports in the Black Sea and the temporary occupation of the Sea of Azov have led to significant difficulties in transporting goods. In addition, the suspension of air travel, the destruction of logistics centers, and the relocation of production and business to safer regions have become some of the necessary steps to adapt to the new conditions[14].

Auto logistics became the primary mechanism of cargo delivery in the first months of the war. However, the export of agricultural products, which had been established, stopped due to the blockade of seaports. The government is taking steps to improve the logistics situation. In particular, two new projects are planned to optimize road transportation. The first is the creation of a "Green Corridor" between the Reni – Giurgiulesti – Galati checkpoints (Ukraine – Moldova – Romania). The other

[13] M. S. Seheda, O. S. Beshta, P. F. Gogolyuk et all, Mathematical model for the management of the wave processes in three-winding transformers with consideration of the main magnetic flux in mining industry, "Journal of Sustainable Mining" 2024; 23(1), 20–39.

[14] I. Nastych, Logistics in Ukraine: changing focus and prospects for recovery. Online: https://propertytimes.com.ua/industrialnaya_nedvizhemost/logistika_v_ukrayini_zmina_fokusa_ta_perspektivi_vidnovlennya.

is the launch of trucks through Krasnoilk-Vicova de Sousse, which is currently used only for empty trucks. As for rail transportation, there is a significant lack of railroad crossings in the border regions of Ukraine, which complicates exports and imports, so it is already necessary to increase the number of railroad crossings[15].

Nevertheless, the modernization of the infrastructure in line with the European standards will allow Ukraine to strengthen its presence in the European market. Although the modernization of transport infrastructure is a long and complex process, its successful implementation will allow Ukraine to achieve significant progress in its socio-economic development, improve the population's quality of life, grow the economy, and strengthen the country's international position.

The modern logistics center is a multifunctional complex that provides comprehensive services for storing, processing, and distributing goods. It is equipped with modern technologies that automate processes, improve accounting accuracy, and ensure the safety of goods. The creation of such centers will help to ensure the necessary conditions for storing various types of goods, including perishable items, electronics, and pharmaceuticals, taking into account their specific requirements, performing additional operations with goods, such as packaging, labeling, order picking, organizing the delivery of goods to end users or other participants in the supply chain, collecting, processing and analyzing information on the movement of goods, which will optimize the logistics processes.

The benefits of creating modern logistics centers are manifold. They include reduced logistics costs, such as optimization of warehouse processes, reduced order processing time, fewer errors in fast delivery, and accurate order fulfillment. Importantly, the creation of these centers will also lead to the creation of new jobs, thereby increasing the competitiveness of the national economy. One of the most promising areas of the logistics development is the creation of the multimodal logistics complexes that will allow combining different modes of transport (road, rail, water, air) at a single site, which will greatly simplify transshipment operations and reduce the time of cargo delivery. In addition, modern logistics centers can significantly improve the quality of customer service, ensuring that end users receive their goods in a timely and efficient manner.

Today, Ukraine is in need of the high-quality logistics terminals and logistics complexes with a full range of 3PL and 4PL services. Foreign investors acknowledge this and see the economic potential of the logistics business in Ukraine. To address this need, the construction of a logistics hub is planned for 2024, a significant and promising step towards the future of the logistics industry in Ukraine. This initiative holds great potential for the growth and modernization of the logistics sector in Ukraine[16].

Digital transformation affects all areas of our lives, and logistics is no exception. The introduction of digital technologies in logistics processes radically changes the

[15] Ibidem.

[16] I. Nastych, Logistics in Ukraine: changing focus and prospects for recovery… op. cit.

approach to supply chain management, increasing efficiency, transparency, and adaptability to changing market conditions. GPS navigation systems and machine learning algorithms allows for calculation of the optimal delivery routes, considering road conditions, traffic jams, and other factors that minimize fuel costs and travel time. Special sensors and software can track cargo movement at all delivery stages, increasing transportation transparency and safety. Robotic systems and warehouse management systems (WMS) help optimize the processes of receiving, storing, and shipping goods, reduce the likelihood of errors, and increase productivity. Transitioning from paper to electronic formats will speed up the information processing, reduce errors, and improve data security. Collecting and analyzing large amounts of data will facilitate identifying patterns, forecasting demand, optimizing inventory, and making more informed decisions. Block chain technology, with its decentralized and tamper-proof nature, will ensure high data security and transparency, which is especially important for tracking the origin of goods and combating counterfeiting.

Implementing digital technologies in logistics may have benefits, such as route optimization, process automation, error reduction, savings on fuel, personnel, and warehouse space, fast delivery, real-time cargo tracking, and information transparency. These benefits translate into more efficient and transparent logistics, enabling companies to offer their customers faster delivery, accurate tracking, and more competitive pricing. This, in turn, can lead to increased customer satisfaction and loyalty, ultimately enhancing the company's competitiveness on the market.

The future of digital logistics is incredibly promising. As technologies advance, the cost of their implementation will decrease, and the level of automation will increase. This will pave the way for more efficient, flexible, and sustainable logistics systems that can effectively meet the demands of the modern market.

Establishing a level playing field is a cornerstone of a healthy market, and the logistics services market is no exception. This principle ensures that all market participants, regardless of their size, ownership, or other factors, have equal opportunities to conduct business without any unfair advantages or restrictions.

The level playing field in the logistics services market is influenced by factors such as the regulatory environment, i.e. clear, transparent, and non-discriminatory rules of the game, absence of excessive regulation and bureaucratic barriers, access to infrastructure, a fair and transparent tax system that does not create advantages for individual companies, control over compliance with antitrust laws, transparency of public procurement, etc.

We propose to create equal conditions for competition in the logistics services market using the following principles.

Decentralization plays a crucial role in acknowledging regional specifics and providing a more flexible response to local needs. However, it is essential to establish clear criteria and limits of powers for the local authorities to prevent regulatory discrepancies:

– simplification of procedures, which includes a reduction in the number of permits, replacing some of the permitting procedures with a declarative principle

when a business entity declares that its actions comply with the requirements of the law, shortening the review period and reducing the number of required documents;

- support for small and medium-sized businesses, for which the financial support programs will be developed, consultations will be provided, and training and seminars will be organized. Preferential tax rates for small businesses will be established, and special conditions for small and medium-sized enterprises to participate in public procurement will be developed;
- attracting private investment, which will be accompanied by a reduction in corruption; ensuring the protection of investors' rights; simplifying the business registration procedure; developing investment projects in the logistics sector that will be of interest to investors; providing state guarantees for investors involved in the implementation of investment projects in the logistics sector, and attracting funds from international financial institutions to finance investment projects;
- strengthen control over compliance with antitrust laws through creating an effective antitrust regulation system, regular market monitoring, fair investigation of violations, and application of effective sanctions.

Therefore, the state's role in creating equal conditions for competition in the logistics services market is crucial. This element of the mechanism for ensuring the state regulation is one of the key factors in the development of the industry. It will increase the efficiency of logistics processes, reduce transportation costs, increase exports, and improve the quality of customer service. This is a significant area where state support and innovation can make a substantial impact.

Small and medium-sized businesses are the driving force behind the economic development of any country, including Ukraine. They provide job opportunities, stimulate innovation, and promote competition. Therefore, state support for small and medium-sized businesses, which can lead to increased employment, accelerated innovation, and enhanced competitiveness, is not just a priority area of economic policy, but a promising avenue for the future.

The state supports small and medium-sized businesses by providing loans on preferential terms or with state guarantees, non-refundable financial assistance for implementing innovative projects, and reducing the tax burden for small businesses. In terms of non-financial assistance, we should emphasize such elements as providing advice on business, marketing, finance, etc., organizing training and seminars for entrepreneurs, providing access to information on markets, technologies, and government programs, reducing the number of permits and simplifying procedures for obtaining them, building industrial parks, technology parks, and other infrastructure facilities necessary for the development of small and medium-sized businesses.

The prospects for this expected systemic change include expanding access to financing, simplifying administrative procedures, improving the efficiency of government programs, and cooperation with business associations. Support for small and medium-sized businesses is not just one of the critical factors in Ukraine's economic growth, but a testament to the integral role these businesses play in our country's progress.

Stimulating innovation is not just an integral part of the logistics sector's development, but also a beacon of progress. New technologies and approaches help to optimize processes, reduce costs, and improve the quality of services. This link in the large mechanism of regulating the logistics services market will not just increase efficiency, reduce costs, and improve the quality of services, but it will also inspire a new era of logistics.

We propose to stimulate such innovations in logistics, which can be applied to develop the Internet of Things (IoT) for real-time cargo tracking, implement artificial intelligence to optimize routes and forecast demand, use block chain to ensure transparency and security of supply chains and develop mobile applications for customers and employees. We also see the feasibility of using green technologies, such as environmentally friendly fuels and vehicles, optimizing routes to reduce CO_2 emissions, using recyclable packaging materials, and new business models that include the creation of platforms for connecting carriers and cargo owners and developing new services such as last-mile delivery or fulfillment. Implementing such technologies and approaches can increase the efficiency of logistics processes, reduce costs, and ensure high-quality services.

As shown in figure 1, a strategic priority of effective state regulation of the logistics services market leads to expected changes such as effective control over compliance with the law, ensuring market transparency, and combating corruption.

In particular, the tools of effective control include scheduled and unscheduled inspections of business entities, which allow for the detection of violations of the law at early stages, the use of data analysis software, GPS navigation systems, drones, etc., which increase the efficiency of control and reduce costs, simplify control procedures, reduce the number of bureaucratic barriers and increase transparency. The involvement of civil society organizations and citizens in monitoring compliance with the law will provide additional information on violations. In contrast, cooperation with international organizations and other countries will allow for the exchange of experiences and implementation of the best international practices.

By implementing modern control methods, increasing transparency, and fighting corruption, we can create a level playing field, ensure consumer protection, and increase the investment attractiveness of the industry.

An equally important element is market transparency, which requires publishing information on tariffs, routes, availability of vehicles, carrier licenses, inspection results, etc. This entails the creation of a unified electronic register of business entities providing logistics services, the development of convenient online services for finding information on logistics services, and the guarantee that information is available to all stakeholders. Establishing mechanisms for public control over the activities of logistics companies, encouraging citizens to report violations, involving business representatives in the development and implementation of transparency measures, and participating in international initiatives to ensure transparency in transport corridors will make the logistics services market in Ukraine more transparent, efficient, and attractive to investors.

The critical areas of fighting corruption in the logistics sector include transparency and openness, strengthening control, reducing discretionary powers, and preventing conflicts of interest.

The importance of fighting corruption in logistics lies in a transparent and predictable market that attracts investment. An effective fight against corruption increases trust in the country as a reliable partner for business. All market participants receive equal opportunities. Reducing corruption will help optimize costs and improve the quality of services. Thus, a comprehensive approach to fighting corruption in the logistics sector, including transparency, control, prevention of conflicts of interest, and witness protection, is a prerequisite for developing the logistics sector and the country's economy. Implementing these measures will create a favorable environment for businesses, increase the efficiency of logistics processes, and ensure sustainable economic development.

The strategic priority is international cooperation that encompasses systemic changes such as integration into international logistics chains and the conclusion of international agreements. These agreements, as depicted in figure 1, play a crucial role in facilitating global trade and economic development.

Since integration into international logistics chains involves inclusion of the national economy or individual companies into the global flows of goods and services, it should be highlighted that this implies active participation in international trade and the creation of efficient delivery and distribution systems in the global market.

The access to global markets will allow companies to expand their customer base and increase sales. The access to the global supply chains will enable companies to purchase raw materials and components at more favorable prices. The development of exports and investments in logistics will create new jobs, and cooperation with international companies will stimulate technological development and increase the competitiveness of the national economy. It is worth noting that the primary function of modern transport corridors is to deliver goods via the shortest route and as quickly as possible. At the same time, such operations include transporting goods from one mode of transport to another, handling, packaging, sorting, etc.[17].

The international network of transport corridors is defined by the Declarations of the First (31.10.1991, Prague), Second (14-16.03.1994, Crete), and Third (23-25.06.1997, Helsinki) European Transport Conferences. The Cretan Conference finally approved the routes of the first ten trans-European international transport corridors, later called "Cretan"[18].

Considering the strategies of integration into the international logistics chains through the development of transport infrastructure, simplification of customs procedures, support for small and medium-sized businesses, development of logistics services, and staff training, we can firmly state that the logistics sector is efficient.

[17] O. M. Sohatska, R. E. Zvarych, V. M. Panasyuk et all, International logistics, "Wunu.edu.ua" 2022.

[18] Kh. Prytula, Y. Kalat, I. Kyryk, Areas Of Influence Of International Transport Corridors As A New Object Of The State Regional Policy Of Ukraine For The Period Up To 2027, "Efektyvna Ekonomika" 2020; 11: 1-8.

Here is an example of countries that have successfully integrated into the international logistics chains[19]:

- China – due to significant investments in infrastructure development and the creation of special economic zones, it has become one of the largest exporters in the world;
- Singapore has become one of the leading logistics centers in Asia due to its strategic location and developed port infrastructure;
- Germany is known for its high-quality goods and efficient logistics system.

Thus, integration into international logistics chains is an important factor in the development of the national economy. It helps increase exports, create new job opportunities, and improve competitiveness.

The conclusion of international agreements is a complex process that involves interaction between states and international organizations to regulate the international relations in various areas, including economics, politics, and culture. These documents establish the rules of the game in the international arena, define the rights and obligations of states, and outline cooperation in various fields. Agreements can be a tool for the peaceful settlement of disputes between states and create a legal basis for the activities of international organizations such as the UN, the World Trade Organization, etc.

The importance of international agreements for Ukraine cannot be overstated. These agreements, whether they pertain to free trade, investment, or other areas, open new markets for Ukrainian goods and services. They also facilitate the development of cooperation with other countries and may contain provisions that protect the rights of Ukrainian citizens and companies abroad. Overall, international agreements are a cornerstone of international relations, fostering cooperation between states, the resolution of global problems, and the development of international trade.

In summary, implementing the proposed strategic priorities and expected systemic changes will increase the efficiency of logistics processes, reduce costs, increase exports, improve the quality of customer service, and ensure the sustainable development of Ukraine's economy. However, as already mentioned, the successful implementation of the proposed reforms is possible only if the government, businesses, and the public cooperate closely. The public's role in this process is crucial, as their support and active participation will contribute to creating a modern and efficient logistics system that will meet the requirements of the 21st century.

One critical mechanism of modern state regulation of the logistics market is the creation of a single digital portal for the logistics services. The primary purpose of this portal is to centralize information and simplify interaction between all participants in the logistics chain by increasing the market transparency.

Figure 2 presents the portal's functionality (a set of capabilities and tasks that a digital portal of logistics services can perform).

[19] B. V. Samoilenko, K. V. Pavlov, O. M. Pavlova, O. M. Serhiychuk, Analysis of the development of the Ukrainian logistics services market in the context of European integration processes, "International scientific journal "Internauka"" 2024; 10: 1-18.

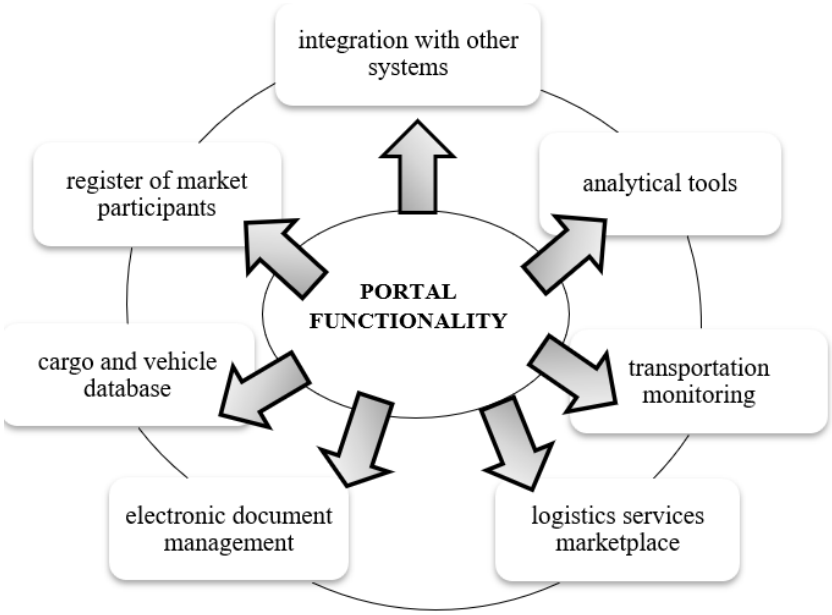


Figure 2. Functionality of a single digital portal of logistics services
Source: compiled by the authors

A digital portal, as a tool for efficient management of logistics processes, is designed to be user-friendly, providing a wide range of services for various participants in the logistics chain. It is constituted of the essential elements depicted in figure 2.

1. The register of market participants includes a simple and intuitive registration procedure for all participants (carriers, freight forwarders, cargo owners, etc.), detailed information about each participant (contacts, licenses, certificates, vehicle fleet, etc.), as well as a quick search for reliable partners by various criteria.
2. The cargo and vehicle database contains a detailed description of the cargo (type, weight, dimensions, and special requirements), transportation route, status and characteristics of vehicles (type, carrying capacity, dimensions), availability, and technical condition.
3. We propose to create an electronic document flow for the documents such as waybills, contracts, customs declarations, etc. This system will significantly reduce paperwork, streamline processes, and ensure the legal force of documents through electronic digital signatures. A centralized storage of all transportation-related documents will be formed, making it easier to access and manage important information.
4. The logistics services marketplace will include offer publication, i.e. carriers can publish their transportation offers, service search (cargo owners can quickly find the necessary logistics services at the best price), and online booking (the ability to order logistics services online).
5. Transportation monitoring should include GPS tracking (real-time tracking of vehicle movements), status change notification (receiving notifications of

changes in the status of cargo (receipt, dispatch, delivery, etc.)), route analytics (optimizing delivery routes based on traffic data), and other factors.

6. Analytical tools will consist of market statistics (analysis of market trends, supply, and demand for logistics services), personalized analytics (individual reports for each user with an analysis of their activities), and forecasting (prediction of future market trends).
7. Integration with other systems will be formed by electronic customs (automatic data exchange with customs authorities), banking system (payment for services through online banking), and warehouse management system (integration with warehouse management systems).

The advantages of such a portal are manifold and substantial. It will increase the market transparency by making all the information about market participants and their services readily available online. The automation of routine operations and reduction of paperwork will lead to a significant decrease in administrative burden. This, in turn, will increase the efficiency of the logistics processes, create a level playing field for all participants, and support management decision-making. Overall, the portal will revolutionize the logistics sector in Ukraine, making it more efficient, transparent, and conducive to business development[20].

Therefore, creating a single digital portal for logistics services is an important step towards modernizing the logistics sector in Ukraine. This tool will increase the efficiency of the logistics processes, simplify the interaction between market participants, and create favorable conditions for business development.

The development and implementation of the National Logistics Development Strategy is a critical mechanism for ensuring state regulation of the logistics services market. This comprehensive document defines priorities, goals, and measures for the development of the country's logistics sector in the medium and long term. It is an essential tool for ensuring the competitiveness of the national economy, increasing the efficiency of foreign trade, and improving the population's quality of life. The strategy will guide and coordinate efforts to modernize the logistics sector, making it more efficient, competitive, and beneficial for the economy and the population.

It is the national logistics development strategy that promotes the integrated development of the logistics infrastructure, technologies, and human resources, it creates favorable conditions for attracting investment in the logistics sector, improves production and export efficiency, reduces administrative barriers and simplifies business procedures, and improves the availability of goods and services and reduces their cost.

The critical elements of the national logistics development Strategy include the construction of new roads, railways, ports, and airports, modernization of the customs system through simplification of customs procedures, introduction of electronic document management, development of logistics centers, including the creation of modern warehouses, terminals and other logistics facilities, support for innovation

[20] L. G. Kharsun, Logistics services for trade flows between Ukraine and the EU countries, "Ekonomika Ukrainy" 2016; 4: 112-121.

by stimulating the development and implementation of new technologies in logistics, development of human resources through advanced training of logistics specialists, cooperation with international organizations, and the creation of a new logistics hub.

The national Strategy for logistics development is not just a plan, but also a powerful tool that can transform our country into a modern logistics hub. This transformation will not only contribute to economic prosperity but also significantly improve the quality of life for our population.

By establishing a state fund for the logistics development, we are unleashing a powerful tool that can significantly influence the development of our logistics infrastructure. This fund has the potential to increase the competitiveness of our national economy, promote innovation, and provide stable financing for strategic logistics projects, instilling a sense of optimism and confidence in our proposed changes.

The primary purpose of creating such a fund is to provide the financial resources for the construction and modernization of logistics infrastructure, support for innovative projects, human capital development, and cooperation with international organizations.

The sources of funding may include the state budget, namely direct allocations, investments of state-owned banks in lending to the fund's projects, raising funds from domestic and foreign investors, donations in the form of grants from international organizations, and funds from customs payments, which are partially directed to the development of logistics.

In the course of the fund's work, projects will be selected for funding based on a competitive selection process or by a government order. It will be possible to provide grants, loans, and investments depending on the type of project and its implementation stage. The funds received from the fund will be monitored and controlled, and the effectiveness of investments and the impact of projects on the development of the logistics sector will be assessed.

It is advisable to outline the benefits of creating the fund, which include:

- increased investment in logistics;
- accelerating the development of logistics infrastructure;
- increasing the competitiveness of the national economy;
- creation of new job opportunities;
- increase in foreign trade.

The successful operation of the State Logistics Development Fund requires the following:

- creation of transparent mechanisms for managing the fund, involvement of independent experts;
- introduction of a monitoring and audit system;
- involvement of business representatives in the decision-making process;
- exchange of experience with other countries.

Discussion

Thus, creating a state fund for logistics development is an essential step toward modernizing the logistics sector and increasing the competitiveness of the national economy. However, for the Fund to be successful, it is necessary to ensure a transparent management system and effective control and involvement of all stakeholders.

It is worth noting that Ukraine has introduced several important legislative mechanisms that facilitate the attraction of private investment. These include public-private partnerships, the creation of the industrial parks, and state support for investment projects involving significant investments (over EUR 12 million). The laws governing these areas are constantly being improved. There has also been an increase in support from the international financial institutions. However, there are specific difficulties in implementing these mechanisms, including a lack of investor confidence in the judicial system, risks associated with the war, and low capacity of the responsible government agencies. Ukraine's potential in logistics is indeed significant. This is due to the interest of investors in the country's capabilities, business reformatting in the context of the war, and the gradual development of the western and central regions despite the numerous difficulties observed today. The main obstacle to attracting foreign investment is military risks, such as a high probability of damage and destruction of logistics facilities[21].

In general, the analysis of the presented mechanisms of state regulation of the logistics market, i.e. the creation of a single digital portal for logistics services, the development of a national Strategy for the development of logistics, and the formation of a state fund for the development of logistics, leads to the conclusion that they are complementary and synergistic.

A single digital portal, as a key component of the digital transformation of the logistics sector, serves as a tool for the operational management of logistics processes. It ensures transparency, efficiency, and accessibility of information for all market participants. The portal's role in the digital transformation is significant, as it not only facilitates the integration with other government systems but also paves the way for the adoption of the advanced technologies such as IoT, AI, and blockchain in the logistics sector.

The National Logistics Development Strategy, with its inspiring strategic vision, defines the long-term goals and priorities for the industry's development. It creates a robust framework for the implementation of specific projects and activities, providing a beacon of hope for the future of logistics development. This strategy also plays a pivotal role in coordinating the efforts of the state, business, and the public.

The State Logistics Development Fund, a catalyst for growth, provides the necessary financial resources to implement the strategic projects envisaged by the national strategy. It plays a crucial role in accelerating infrastructure development, supporting innovation, and most importantly, promoting private investment. This emphasis on

[21] I. Nastych, Logistics in Ukraine: changing focus and prospects for recovery… op. cit.

private investment encourages the audience about the potential for growth in the logistics sector.

Conclusions

The synergy of these mechanisms allows to:

1. Create an effective management system for the logistics sector. The digital portal provides operational management, the strategy determines the direction of development, and the fund provides financial resources.
2. Increase the competitiveness of the national economy because developed logistics reduces production costs, improves the quality of services, and promotes export growth.
3. Attract additional investment, as transparency, efficiency, and government support make the logistics sector attractive to investors.
4. Create new job opportunities, as the development of logistics stimulates the creation of new jobs in various segments of the economy.
5. Improve the population's quality of life, as developed logistics ensures the availability of goods and services and reduces their cost.

Taking into account the specific features of the presented mechanisms, it is necessary to indicate the perspective visions, in particular:

1. Expanding the functionality of the digital portal, such as integrating with new systems, developing analytical tools, and personalizing services.
2. Deepen cooperation between the state and business in the context of jointly identifying logistics development priorities and involving business in the development and implementation of the strategy.
3. Involvement of international experience, including cooperation with international organizations and companies to implement advanced technologies and practices.
4. The development of green logistics will result from stimulating environmentally friendly technologies and vehicles.

Thus, the comprehensive application of these mechanisms will allow Ukraine to become a modern logistics hub, contributing to economic growth, improving the population's quality of life, and strengthening the country's international position.

Bibliography

Kharsun L.G., Logistics services for trade flows between Ukraine and the EU countries, "Ekonomika Ukrainy" 2016; 4: 112-121.

Kononenko M., Khomanko O., Cabana E. et all, Using the methods to calculate parameters of drilling and +blasting operations for emulsion explosives, "Acta Montanistica Slovaca" 2023; 28(v28/i3), 655–667.

Kononenko M., Khomenko O., Kovalenko I. et all, Determining the performance of explosives for blasting management, "Rudarsko-Geološko-Naftni Zbornik" 2023; 38(3): 19–28.

Nastych I., Logistics in Ukraine: changing focus and prospects for recovery. Online: https://propertytimes.com.ua/industrialnaya_nedvizhemost/logistika_v_ukrayini_zmina_fokusa_ta_perspektivi_vidnovlennya.

Pavlov K., Pavlova O., Kotsko T. et all, Functioning efficiency of the electricity market of the western region of Ukraine, "Polityka Energetyczna – Energy Policy Journal" 2023; 26(2), 47-64.

Pavlov K., Pavlova O., Ilyin L. et all, Assessment of Innovation and Investment Attractiveness of the Western Ukrainian Regional Market of Tourist Services, "ECONOMICS" 2023; 11(1): 45-68.

Pavlova O. M., Pavlov K., Bortnik A. et all, Methodological Approaches to Project Evaluation in Business, Logistics and Trade, "Deleted Journal" 2024; 4(4): 1-15.

Pavlova O. M., Human capital development in the context of European integration changes and economic challenges, "International scientific journal "Internauka"" 2024; 6: 1-17.

Pavlova O. M., Novosad O. V., Murzina A. V. et all, Development of entrepreneurship in the field of IT business in the conditions of change and communication, "Actual problems of innovative economy and law" 2024; 2: 124-130.

Pavlova O. M., Pavlov K. V., Logistics interaction between the subjects of the gas transportation industry: implementation mechanism and prospects, "International scientific journal "Internauka"" 2020; 3(35): 46-51.

Pavlova H., Babii I., Volovik D., Establishment Of Logistics At The Level Of International Economic Relations, "Innovation and Sustainability" 2022; 2: 139–146.

Prytula Kh., Kalat Y., Kyryk I., Areas Of Influence Of International Transport Corridors As A New Object Of The State Regional Policy Of Ukraine For The Period Up To 2027, "Efektyvna Ekonomika" 2020; 11: 1-8.

Samoilenko B. V., Pavlov K. V., Pavlova O. M., Serhiychuk O. M., Analysis of the development of the Ukrainian logistics services market in the context of European integration processes, "International scientific journal "Internauka"" 2024; 10: 1-18.

Seheda M. S., Beshta O. S., Gogolyuk P. F. et all, Mathematical model for the management of the wave processes in three-winding transformers with consideration of the main magnetic flux in mining industry, "Journal of Sustainable Mining" 2024; 23(1), 20–39.

Sohatska O. M., Zvarych R. E., Panasyuk V. M. et all, International logistics, "Wunu.edu.ua" 2022.

Wołowiec T., Pavlov K., Pavlova O., Zaichuk K., Tourist Services of the Western Region of Ukraine: Rating and Analysis, "ECONOMICS" 2022; 10(1): 183-198.

Siryk Z., Hrafska O., Pavlov K., Samoilenko B., Chornyi R., Sustainable development trends in the Ukrainian logistics market, "E3S Web Conf." 2024; 567: 1-11.