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ROLE OF ACADEMIA IN THE LIFE OF AN ACADEMIC CITY: A CASE STUDY OF POZNAŃ, POLAND

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Key words: academia, academic centres, development of a city, management of a city.

Abstract

The aim of this study has been to evaluate how a city-academia cooperation model functions, using the city of Poznań as a case for this study. Several benefits were identified from having a college or university seated in a city, for instance: stimulation of the city's economic growth and development and of its cultural life, positive influence on the labour market, shaping a positive image of the city. For these reasons, the city authorities have been making efforts to attract students to Poznań, to sustain their interest in the city while in academia, and to retain the graduates in the city. It is highly probable that the cooperation model identified in Poznań will work in other academic centres, generating a number of development benefits.

ROLA UCZELNI W FUNKCJONOWANIU MIASTA AKADEMICKIEGO NA PRZYKŁADZIE POZNANIA

Kod JEL: R11, O180, O150.

Słowa kluczowe: uczelnie, ośrodki akademickie, rozwój miasta, zarządzanie miastem.

Abstrakt

W opracowaniu podjęto próbę oceny funkcjonowania modelu współpracy miasto-uczelnie na przykładzie Poznania. Zidentyfikowano wiele korzyści z funkcjonowania uczelni w mieście, którymi są: pobudzenie wzrostu i rozwoju gospodarczego miasta, rozwój kulturowy miasta, pozytywne

oddziaływanie na sytuację na rynku pracy, kształtowanie pozytywnego wizerunku miasta. Z tych powodów władze miasta podjęły działania, których celem jest przyciąganie studentów do Poznania, utrzymanie ich zainteresowania miastem w trakcie studiów oraz zatrzymanie absolwentów w mieście. Taki model współpracy, jaki zidentyfikowano w badanym mieście, z dużym prawdopodobieństwem może się sprawdzić także w innych ośrodkach akademickich, przynosząc im wiele korzyści rozwojowych.

Review of the Literature Dealing with the Role of Academia in the Life of a City

With a view to the sustainable development of a city, relevant determinants are sought to be identified and properly employed for the sake of beneficial socio-economic and environmental transformations in the city. In the classical approach, the basic development factors are labour, land and capital. More contemporarily, this set has been expanded by adding technological progress and entrepreneurship, which point to the capability of using all available production factors effectively. The priority role of knowledge in stimulating the economic development (knowledge-based economy) is also increasingly recognised. Another significant development determinant is social capital understood as collective, indivisible resources and as a public good (Boccella & Salerno, 2016). The creation and development of knowledge resources as well as the formation of social capital are what the education system deals with, and tertiary education plays a special role in the creation of high quality of these resources. Currently, apart from knowledge-based economy, attention is drawn to the economy based on creativity, indicating that the creativity sector is the one that significantly stimulates the economic development. The so-called creative class is 'the product' of colleges and universities. Without a shadow of a doubt, they affect the development of cities as well as entire regions.

The cities where higher education institutions operate are referred to as academic centres or university cities. Academic centres are most often metropolitan cities, have large populations, are multi-functional and are seats of universities and other higher education institutions (Rewers, 2016). The academic function in these cities is not the dominant one. This is different from university cities, where the university function is often the dominant one and the university campus is an important part of the urban space. Universities have been an integral part of cities for centuries, in which they have played the role of a basic drive of the economic, social and environmental development, having an influence on the employment, real estate market, the leisure facilities or consumer activity in a given city (Cannas da Silva & Valsassina Heitor, 2014). With respect to their impact on economy, universities influence this area by entering networks of regional cooperation and through the commercialisation of their research and scientific outputs. Universities are creators of production

factors, such as human resources and knowledge and innovation, which determine creativity and entrepreneurship, thereby stimulating the economic growth and development (Piotrowska-Piątek, 2014). They attract students (new inhabitants) to the city, thus generating new demand for goods and services, and the growing consumer demand stimulates the demand for investments, which leads to the economic growth of the city and the region. Higher education schools contribute to the formation and reinforcement of the city's position as a regional or subregional centre (Rokita-Poskart, 2015). They create the region's identity and image, improve its competitiveness, attract new city residents – students, scholars, investors, businessmen. The transfer of knowledge, technology and innovation from science to business is a condition underlying the growth of the regional competitiveness. A model developed by the Polish Economic Institute shows that academicity in nearly 80% affects the socio-economic development of cities (*Akademickość polskich miast*, 2019). It is also emphasised that Polish cities together with the functional surroundings are becoming the engine of the economic development of the whole country (Rudewicz, 2020).

A higher demand for accommodation is stimulated by students arriving in academic cities. One reason is the insufficient number of places in residence halls. In some academic centres, the influx of students is so intense that it is referred to in certain UK cities as studentification. It stimulates the development of the real estate rental market but has also given rise to the emergence of new private investments, called the PBSA (Purpose Built Student Accommodation), that is buildings raised for the purpose of housing students (Zasina, 2018).

The university infrastructure, other than ensuring room for academic teaching, is often used for holding the city's cultural and sports events as well as other teaching activities addressed to the local population (courses, the University of the Third Age, classes for children, etc.). This infrastructure, often contained in historic buildings, also shapes the city's positive image. Moreover, the rhythm of an academic year affects the rhythm of the city's life. In the so-called university city, a university is one of the principal employers. University students and staff create a specific type of urban culture, known as student (academic) culture, and simultaneously co-create the creative class (Florida, 2007). Academic culture is a combination of science and student entertainment, and as such is governed by specific social norms and behaviours (Rewers, 2016). The collage of learning and playing which students bring to the city is defined in American studies as the academic lifestyle (Chatterton & Hollands, 2003). Universities are thought to be urban institutions which collaborate with people, institutions and enterprises operating in a given city, and with which they share some challenges (Perry & Wiewel (Eds.), 2005). Colleges and universities shape both professional and social roles. They also create desirable moral attitudes, cultural customs, lifestyles, systems of values, etc. The research conducted in tertiary education institutions represents one of the basic conditions for preparing the local community to undertake entrepreneurial activities, which

determines the development of innovations and is a source of patents (Breschi *et al.*, 2007). Academia also encourages local residents to take steps to forward the city's social and economic development.

The concept of 'the urban university', which emerged over 40 years ago, focused on education orientated towards the city, research, strategies of services and responsibilities of a university to the society (Hill, 1981). In 1994, a model of higher education was developed based on the notion of a socially engaged university (Boyer, 1994). This model envisaged the engagement of students in social matters, expansion of education over the whole society, efforts to associate theory with practice, and promotion of an integrated view of knowledge. In recent years, higher education institutions have been assigned the so-called third mission, which suggests that apart from education and research the academic function of tertiary education schools obliges them to act for the sake of regional development (Kauf & Stec, 2017). Thus, colleges and universities become the region's research and development background, so that it can transform into a learning region, operating as a store of knowledge and ideas, which are a source of innovation and a motor of economic growth (Florida, 2001). Academics are able to identify, research and develop technological needs of the city and region, in order to satisfy local needs and then to find export markets. Studies conducted at universities are often oriented towards this goal (Hall, 1997).

Methodology

The role of a university in a city is therefore considered in four dimensions: as an economic entity, a producer of knowledge, an institution forming human capital, and as a regional actor' (Boucher *et al.*, 2003). The city-academia cooperation model largely contributes to the social, cultural and economic life of modern cities (Ngo & Trinh, 2016). The following paper presents an attempt at making an evaluation of how such a model functions, using the city of Poznań as an example. To this end, an in-depth interview was carried out with the deputy director of the department of the City's Development and International Cooperation, who is also the plenipotentiary of the Mayor of Poznań for matters of the youth and cooperation with higher education institutions. This case study is a detailed description of the actual economic development, its components and the organisation's environment, which served to identify the causes and consequences of its course. Based on the collected information, this method enabled the author to make an in-depth analysis of the researched problem, to identify its specific characteristics, and to describe its interaction with the organisation or its environment (Grzegorzczuk (Ed.), 2015). In this case, the goal was to test the city-academia cooperation theory, which could be either confirmed or negated.

Role of Academia and the Cooperation of the City Council with Higher Education Schools – a Case Study of the City of Poznań

Poznań is one of the biggest academic centres in Poland. There are eight public and 16 private (including 2 branches) schools of higher education. The best known are: Adam Mickiewicz University, University of Life Sciences, Karol Marcinkowski Medical University, Poznań University of Technology, University of the Arts, Poznań University of Economics and Business, the Ignacy Paderewski Academy of Music, and Poznań University of Physical Education. There are also a few dozens of scientific and research and development institutions, and each year Poznań hosts over 3 thousand conferences. Data on the higher education in Poznań, relative to such information from other Polish cities, are collated in Table 1.

Table 1

Ranking list of Polish cities in terms of number of higher education schools,
number of students and number of graduates in 2020

Cities	Number of higher education schools	Cities	Number of students	Cities	Number of graduates
Warszawa	64	Warszawa	225,200	Warszawa	48,917
Wrocław	24	Kraków	130,428	Kraków	32,881
Poznań	22	Wrocław	107,894	Wrocław	26,429
Kraków	19	Poznań	104,729	Poznań	24,920
Łódź	18	Gdańsk	66,110	Gdańsk	16,007
Gdańsk	13	Łódź	65,325	Lublin	15,009

Source: Local Data Bank, Statistics Poland (GUS).

With respect to the number of higher education schools, Poznań is the third biggest academic center in Poland, after Warsaw and Wrocław. The highest number of students is found in Warsaw, followed by Kraków. The number of students in Wrocław is only slightly higher than in Poznań, which means that Poznań occupies the fourth place in this ranking list. The same is true for the number of graduates. Analysts of the Polish Institute of Economics have demonstrated that the most academic cities in Poland, beside the capital city, are Kraków, Poznań and Wrocław (*Akademickość polskich miast*, 2019). This justifies the conclusion that Poznań is an academic centre of considerable importance in Poland, and a case study involving this city can provide the evidence for many valuable conclusions, which other academic cities in Poland can benefit from.

According to the Poznań City Council employees, the academic community is a significant and integral part of the city, even though the number of higher education schools and the number of students have both decreased in the recent years (Tab. 2).

Table 2

Number of students and higher education schools in Poznań in years 2012-2020

Number of higher education school and students	2012	2013	2014	2015	2016	2017	2018	2019	2020
Higher education schools	27	26	25	24	23	24	24	22	22
Students	128,212	121,117	116,969	116,450	112,002	110,346	104,088	102,164	104,729

Source: Local Data Bank, Statistics Poland (GUS).

The number of higher education schools decreased by 5 in years 2012-2020, and the number of students in the same time period fell down by 18.32%. This is consistent with the overall trend in Poland. In that decade, the number of students was decreasing steadily from around 1,927,800 people in the academic year 2008/09 to 1,230,300 in the academic year 2018/19 (*Szkolnictwo wyższe w roku akademickim 2018/2019*, 2019). Relative to the number of students in 2012 equal 1,764,060, the rate of decrease in the number of students in the whole country over the analysed period was 31.8%. The decrease in the number of people studying in Poznań was therefore over 10% lower than the decrease in the total number of students in Poland, which is a positive result. Nevertheless, in the face of this regress, the city authorities have been making efforts to cooperate with the authorities of the higher education schools in their city to attract new students, retain those who have chosen to study in Poznań and also to entice the graduates to stay in their city. It has been acknowledged that the human and economic potential of the Poznań academic community generates social, cultural and financial benefits for the city. The engagement of the academic community in the social, cultural and sport life, and in the entertainment sphere creates the atmosphere of a student city and gives the city a large dose of positive energy. Furthermore, it boosts the economy.

It has been observed that cities which play an academic function have been transforming in the past decades into consumption-oriented student cities, whose economies function and develop by meeting the demands of the academic youth (Zasina, 2020). Whenever a new academic year starts, the demand for educational services in Poznań as well as for public transport, catering or housing increase because the student community of over 100,000 people is a large group of consumers. Considering the fact that over 80% of these students come from outside Poznań, it can be said that the income they spend in this city is generated in other localities.

In the opinion of the Poznań City Council staff, higher education schools also generate the high quality of human resources, which attracts investors. Entrepreneurs consider both the location of a given city and the availability of highly qualified workforce, and Poznań offers the latter owing to the high level of education at its colleges and universities. Locating new investments in Poznań means higher revenues for the city from taxes and more jobs. Moreover, there are more possibilities for the transfer of knowledge to economy; there is progress in the technological and organizational innovativeness and development of the creative sector. With respect to work places, it is worth adding that the Poznań-based schools of higher education are important employers on the local labour market.

When analysing the benefits from having schools of higher education in their city, the City Council employees also emphasised the role of academic mentors and experts, who join them in making efforts to solve problems significant for the development of Poznań. They also underlined the considerable importance of the investments made by higher education schools in facilities (school buildings, research facilities, amenities) in the spatial and architectural development of the city. Other functions of academia which are acknowledged are the culture-forming role of the academic community, popularisation of science, or academic sports, both amateur and professional. By understanding and appreciating the importance of higher education schools in the development of the city, the local authorities consider it their priority to tighten the collaboration with the academic and scientific community, and therefore consistently implement measures to support the development of universities and colleges and to shape the image of Poznań as a strong academic centre. The undertaken actions are rooted in the provisions of the strategic documents of the city of Poznań, which are presented in Table 3.

The activities launched by the city authorities (previously referred to as the activities undertaken by the city of Poznań) include the ones addressed to potential students, to persons already studying in Poznań, to graduates and to academic teachers.

Since 2010, the city has organised meetings with potential students in secondary schools, during which school pupils can become acquainted with the offer of Poznań-based colleges and universities, and with the assets of the city as such. Each year, the plan of on-site visits in schools is accompanied by an online promotional campaign, mostly in social media, under the slogan 'Poznań Attracts'. Since 2011, the city has been participating together with Poznań-based schools of higher education in the educational fairs. Stands of Poznań as an academic city are also present during the Secondary School Graduates' Shows held by the magazine *Perspektywy*. Another initiative is the campaign 'Study in Poznań', which since 2015 has seen representatives of the Poznań City Council and Poznań-based higher education schools participating in international fairs, held in other countries, in order to entice foreign students to study in Poznań.

Table 3

Cooperation of the city of Poznań with the academic and scientific community

Year	Stages in the development of the cooperation
2005	Academic and Scientific Strategy of the City of Poznań
2005	The 'Academic Poznań' Programme in the Plan for the Development of the City of Poznań in years 2005-2010 (the programme has been continued since 2010 under the name of 'The Academic and Scientific Poznań' in the Strategy for the Development of the City of Poznań until 2030. Since 2017, these activities have been continued under the priority 'Strong Metropolis' in the Strategy of the City of Poznań 2020+)
2008	Appointment of the Management Board for the Programme 'Academic and Scientific Poznań' (the current name: Board of Academic and Scientific Poznań)
2008	Agreement on cooperation with Poznań-based public schools of higher education, under the Programme, in the scope of supporting the development of Poznań-based scientific institutions in the education and scientific and research spheres
2018	Appointment of the Plenipotentiary of the Mayor of Poznań for the youth affairs and academic cooperation P
2018	The policy titled "Poznań of the Young 2025"

Source: Report on higher education issued by the Department of the Development of the City and International Cooperation, of the City Council of Poznań, dated on 14 October 2020.

Under the umbrella of the 'Study in Poznań' campaign, the city has taken part in fairs Kazakhstan, Ukraine, Russia, Georgia and Azerbaijan. Representatives of the City Council also took part in meetings organised by the International Conference of Educational Agency and Programmes 'Net Conference Warsaw', held by the New Educational Trend in Warsaw in 2016 and 2017. In early 2021, in cooperation with the National Academic Exchange Agency (NAWA), the Study in Poznań Virtual Educational Fair was held, where 10 Poznań-based higher education schools and the city of Poznań showed their educational offer. The authorities of Poznań address a programme of scholarships to the best secundar school leavers from all Poland to study in Poznań because they wish to attract best students, ambitious, creative, potential leaders, who may become a showcase of the city and future experts in their fields of expertise. The Poznań City Council issues a brochure to encourage students to choose Poznań. There are also sites on Facebook, such as Poznań Attracts in the Polish language and Study in Poznań in English.

The city also participates in the development of persons who are already studying in Poznań, and makes efforts to sustain their interest in the city (as these are potentially well-qualified future residents of Poznań). The City Council co-organises open lectures of outstanding scientists and artists, which allows students of Poznań-based higher education schools to meet the most distinguished representatives of the world's sciences and arts in person. Since 2008, the city has co-funded over 300 lectures held at different colleges and universities, including lectures given by Nobel Prize winners (*Idea programu,*

1998-2023). Another interesting initiative of the City Council is the competition for the best Master Theses and Doctoral Dissertations presented at the Poznań-based higher education institutions, whose aim is to expand and disseminate the knowledge about Poznań, promote achievements of university graduates and young scholars from Poznań colleges and universities, and to scout for young talents to work for the development of the city. Since 2014, the annual Poznań Literary Award has been awarded by the Mayor of Poznań and Rector of Adam Mickiewicz University.

Regarding the integration of foreign students, representatives of the city authorities participate in the so-called Orientation Days, in the organisation of football tournaments Euroasmus and Friends Cup, or in the organisation of concerts called Chop (IN) POZnań. In 2020, the Poznań University of Economics and Business completed the project 'Cultural Diversity', co-funded by the city of Poznań, which was addressed to academic teachers and students in Poznań, and dealt with issues of cultural diversity and anti-discrimination. In the same year, the cooperation between the city and the Poznań University of Economics and Business resulted in holding a debate between the mayor and the rector of this university, under the title 'Role of the university in building an open and diverse city'. Since 2018, the city of Poznań has been involved in the project ON_BOARD_Connecting Cities through Education, which facilitates international exchange of experience and good practice in education.

The city authorities initiate activities to persuade students to remain in Poznań once they graduate, which seems more important nowadays, when the number of college and university graduates has been declining in recent years (Tab. 4).

Table 4

Graduates of higher education schools in Poznań in years 2012-2020

Graduates	2012	2013	2014	2015	2016	2017	2018	2019	2020
College and university graduates in total	35,424	33,894	32,505	32,031	29,171	32,531	27,470	25,061	24,920
Rate of change [%]	-	-4.32	-4.1	-1.46	- 8.93	11.52	-15.56	-8.77	-0.56

Source: Local Data Bank, Statistics Poland (GUS).

In years 2012-2020, the number of graduates decreased by nearly 30% (while the number of students fell down by 20%). Wishing to retain the college and university graduates in Poznań, the city launched in 2013 a project aiming to create an attractive offer of housing for rent available to this group. The city also provides help to students by co-financing their training placements in enterprises located in Poznań. Efforts to retain foreign students in the city are carried out

under the slogans ‘Stay in Poznań’ and ‘Find a Job in Poznań’. The objective is to acquaint young people with possibilities of finding employment in Poznań. Another interesting activity that the city participates in is the Job Fair, which is held at the Poznań University of Economic and Business, among other locations.

The city also endeavours to strengthen its cooperation with the scientific community. Scientists from Poznań, for example, take part in the works on updating the Strategy for the Development of Poznań, developing other strategic documents, solving selected research problems, e.g. the development of e-administration. The city has also collaborated with the Adam Mickiewicz University in the Centre for Audio-visual Documentation, which was established to collect, develop, digitise and disseminate archival films concerning the history of the development of Poznań, and - as experts emphasise – documenting the past is an extremely important element of the preservation of cultural heritage (Pusz & Boryczka 2021, p. 30). Other examples of joint research projects implemented are ‘The functioning and directions of development of the Poznań Agglomeration’, ‘Indicators of life quality of Poznań residents’, research projects dedicated to the preservation of forests in Poznań, or the implementation of the energy strategy of Poznań. The schools of higher education in Poznań can also count on the city’s support in the development of their teaching and research infrastructure – the city has ceded land with the total area of 44 ha on preferential terms to the Poznań-based colleges and universities.

The city has initiated business-academia meetings, and supports academic entrepreneurship. Examples of such initiatives are the Program for Support of Innovative Projects, the Common Work Zone +1, Poznań Day of Entrepreneurship, an initiative supporting the start-up environment, or the city’s contribution to the establishment of science and technology parks (Poznań Science and Technology Park, Wielkopolska Tele-information Cluster). The city is also engaged in the research on labour market, for example in 2013 it helped to establish the Poznań Agglomeration Observatory of Economy and Labour Market, which undertakes activities aiming to counteract unemployment and activate the unemployed. The city authorities also participate in the organisation of congresses and conferences, of which over 3,000 are held annually in Poznań (the Poznań Convention Office was set up for this purpose).

Conclusions

Poznań is a city that can be recognised as one of the most important academic centres in Poland. The authorities of this city have long acknowledged the benefits that can be achieved from the cooperation of the city with colleges and universities, and therefore initiated such collaboration and have been developing it very successfully. They appreciate the role of students, who make up a very large segment of the local market, which generates a high level of consumer demand,

which stimulates the economic growth of this city. They also notice the high quality human capital produced by academia, which stimulates the investment demand, and this additionally translates into the economic growth of the city. It also has a positive impact on the labour market in Poznań. The Poznań-based colleges and universities are large employers as such, and the investments that attract provide the Poznań residents with additional jobs. The tertiary education institutions also invigorate the cultural development of Poznań. They disseminate knowledge among the city's inhabitants (not only students), and the university facilities have a positive influence on the architectural landscape of the entire city. All these factors contribute to the positive image of Poznań, which in the long-term attracts new residents, students, tourists, investors, etc., thus stimulating the growth and economic development of the city and region. For all these reasons, the city of Poznań has entered into intensive cooperation with the colleges and universities seated in this town – it participates in the promotion of their educational offer, it endeavours to retain the graduates in the city and tries to attract talented people from abroad. The city authorities also intensify the cooperation with the academic circles, striving towards the greater participation of researchers in solving the city's problems and engaging in joint research projects. They also undertake initiatives to improve the collaboration of scholars with entrepreneurs from Poznań and the region. The city-academia cooperation model has been operating in Poznań for years, bringing it numerous development benefits.

In all likelihood, this model has been implemented in other academic centres in Poland and it can be concluded that it may bring them similar benefits to those observed in Poznań. These impacts can be direct or indirect. An example of a direct impact of academia on a city and its life is the commercialization of the results of studies conducted in universities by private entrepreneurs, which gives measurable benefits to both sides. A direct effect of higher education institutions on the labour market is also noticeable – they are large institutions, providing hundreds of work places; the indirect effect on the labour market is associated with the creation of the future work force, whose education will correspond to the development needs of the city and region. Other effects of academia in a city consist of the knowledge and innovations it produces, which determine creativity and entrepreneurship, thus stimulating the city's economic growth and development. Tertiary education schools also multiply the human resources in the city, attracting new city dwellers. Through their versatile activities, colleges and universities arouse interest of other entities, attracting their demand to the city. Moreover, higher education schools operating in the city have a positive influence on its image. In addition to the city's economic development, academia also adds to its social development by promoting and creating positive cultural patterns. It can therefore be concluded that the city-academia cooperation model is desirable in supporting the socio-economic growth and development of a city.

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PROFESSIONAL ACTIVATION AND SOCIAL INTEGRATION FROM THE PERSPECTIVE OF THE SOCIAL ECONOMY SECTOR IN POLAND: THE EXAMPLE OF SOCIAL INTEGRATION CENTRES

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Key words: social integration centres, social economy, social reintegration, professional reintegration, social exclusion.

Abstract

This paper examines the role and responsibilities of the social economy (SE) in Poland in promoting social and professional integration for individuals at risk of exclusion. It specifically focuses on Social Integration Centres as an example. The central argument is that these centres play a crucial role in providing multi-level support to at-risk individuals, enabling them to achieve social and professional integration.

The paper provides an overview of the topic, drawing conclusions from relevant literature, data from Statistics Poland, reports from the Ministry of Family, Labour and Social Policy, and scientific studies related to the social economy. The analysis shows that Social Integration Centres in Poland assist in the restoration and enhancement of the abilities of those who are socially excluded to enable them to perform social and professional roles independently. They implement multifaceted reintegration efforts, helping individuals to acquire the necessary skills to reengage in professional and social activities.

**AKTYWIZACJA ZAWODOWA I INTEGRACJA SPOŁECZNA
Z PESPEKTYWY SEKTORA EKONOMII SPOŁECZNEJ W POLSCE.
PRZYKŁAD CENTRÓW INTEGRACJI SPOŁECZNEJ**

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Słowa kluczowe: centra integracji społecznej, ekonomia społeczna, reintegracja społeczna, reintegracja zawodowa, wykluczenie społeczne.

A b s t r a k t

Celem artykułu jest próba odpowiedzi na pytanie o rolę i zadania ekonomii społecznej (ES) w Polsce w obszarze integracji społeczno-zawodowej osób zagrożonych wykluczeniem społecznym na przykładzie centrów integracji społecznej. W artykule sformułowano tezę, zgodnie z którą centra, realizując przedsięwzięcia skoncentrowane na wielopoziomowym wspieraniu osób zagrożonych wykluczeniem, odgrywają istotną rolę w wykonywaniu zadań z zakresu integracji społecznej i zawodowej.

Artykuł ma charakter przeglądowy. Wnioskowanie oparto na przeprowadzonych studiach literaturowych z wykorzystaniem metody analizy i krytyki piśmiennictwa oraz danych pochodzących ze statystyki publicznej Głównego Urzędu Statystycznego, bieżących raportów Ministerstwa Rodziny, Pracy i Polityki Społecznej oraz opracowań naukowych z obszaru ekonomii społecznej. Przeprowadzone analizy wykazały, że centra integracji społecznej w Polsce koncentrują się na pomocy w odbudowywaniu i podtrzymywaniu u osób wykluczonych społecznie zdolności do samodzielnego pełnienia funkcji społecznych i zawodowych. Podejmują wielokierunkowe działania reintegracyjne, pomagając w wykształceniu zdolności niezbędnych do powrotu do aktywności zawodowej i społecznej.

Introduction

Social economy is a new area in social policy and, simultaneously, a sphere of civic and social activity. Through economic activity, it serves vocational and social integration of people at risk of social marginalization, promotes job creation, and enables the provision of social services to the public and local development (*Krajowy program ekonomii...*, 2019, p. 12). Its actions are geared towards improving social, economic and environmental circumstances in specific local communities. SE is often seen as a system of enterprises and organisations, inclusive of their respective regulations, aimed at supporting people at risk of social exclusion (Juszczak & Balina, 2016, p. 32). Entities operating within SE represent a natural organizational response to the need for solutions whose superior goal is to achieve social objectives while seeking to ensure economic return on public expenditure (Wronka-Pośpiec, 2017, p. 9). Their principal aim is not only to produce specific goods and services but also to mobilize social capital, generate innovation and expand the market through increased participation

of the previously excluded persons (Pearce, 2003, p. 190). Although SE is part of the market economy, its mission and goals are targeted outside the market (Hausner & Laurisz, 2008, p. 9). According to B. Kryk, SE makes a significant contribution as a sector to boosting employment and sustainable economic growth and plays an important role in increasing the competitiveness and efficiency of the European economy (Kryk, 2017, p. 221).

The sector's defining discourses invoke solidarity and social cohesion, responsibility and commitment, participation, autonomy and independence, to meet the needs that other sectors fail to satisfy (Roelants, 2002, p. 3). Alternative terms include new social economy, popular economy, the economy of the poor, economy of local communities, civic economy, labour economy and cooperative economy (Spicker *et al.*, 2007, p. 183, 184).

This paper assesses the tasks and role of the social economy concerning the social and professional integration of persons at risk of social exclusion, given the example of social integration centres. With this end in mind, the following problem questions are formulated:

- what is the essence of the integrative activities undertaken by the SICs?
- in what form and to what extent do the centres implement socio-professional reintegration programmes for the benefit of the participants?

This study provides an overview of the field of social economy, utilizing relevant literature on the subject, including Polish and foreign-language publications, as well as current legislation governing the organization and operation of Social Integration Centres as entities that promote integration. In addition, the study examines existing data, including findings from other researchers and specialized institutions studying the social economy sector. The analysis of this data involves the collection, selection, description, and scientific interpretation of available sources such as public statistics from Statistics Poland, current reports from the Ministry of Family, Labour and Social Policy, and empirical studies related to the social economy. The study shows that since their establishment in 2003, Social Integration Centres in Poland have consistently implemented specialized programs to work with socially excluded or at-risk individuals. These programs involve a comprehensive approach to social employment that aims to combat poverty and social exclusion. This is achieved through courses held at Social Integration Centres that promote professional and social reintegration, as well as supported employment, where individuals are assisted in finding employment or starting their own business (*Informacja na temat centrów i klubów integracji społecznej...*, 2022, p. 9). This text is intended to encourage further discussion to raise public awareness of the role and importance of social integration within the social economy framework. Due to the multi-faceted and extensive nature of the issue, the analysis has been confined to social integration centres as reintegration actors.

The first part of the paper defines social economy in the light of its integrative character based on available Polish and foreign literature. Next, the scope and

directions of SIC activities in social and professional integration are discussed. In order to accomplish the goal of this study in full, subsequent sections analyse statistical data on the centres in Poland, including quantitative changes in recent years, i.e. 2017-2021. The conclusion recapitulates the role and integrative activities undertaken to date by the centres to support socially excluded persons.

The Reintegrative Nature of the Social Economy

SE involves all forms of social activity combined with economic enterprise in the social space; the following characteristics constitute it: the primacy of social goals over economic profit, democracy, flexibility, innovation (understood as the capacity to adapt to fluctuating social needs and economic circumstances), as well as voluntary participation (Blicharz, 2017, p. 219). It is a domain of socio-economic action arising at the juncture between the entrepreneurial sector and the non-governmental, non-profit sector. Today, it represents a sector of the economy which remains complementary to the market and the state (Kryk, 2013, p. 83).

The approach to SE is twofold. Although it is a mode of looking at economics in the sense of social science, it is also identified with the social economy or entrepreneurship, and the latter notion is prevalent in scholarly and public spaces and discourses. As such, it denotes the practical aspect, i.e. specific legal solutions, as well as specific entities and their modes of operation (Szopa, 2007, p. 65). Simultaneously, whether in Poland or abroad, a single and consistent description and definition of social enterprise is conspicuously lacking. According to M. Bull and H. Crompton, three main types can be distinguished (Bull & Crompton, 2005, p. 6):

- social enterprises engaged in stimulating activity in local communities (maximizing the value arising from the social capital inherent in the community);
- commercial social enterprises which pursue a social purpose and mission;
- non-profit organisations which focus on entrepreneurship and financial independence.

J. Defoumy and P. Develtere underline that SE encompasses a multidimensional and broad range of forms of civic activity that draws on solidarity and cooperation. It is a mechanism capable of transforming the passive dependence of large groups of people into a system of mutual responsibility (Defoumy & Develtere, 1997, p. 1).

M. Boni observes that the social economy is an example of an innovative instrument of social inclusion, as it offers jobs and professional employment where competition between employees is not a priority since work is one of the elements which restores self-confidence, influences mobility and encourages one to acquire further skills on the professional market (Boni, 2007, p. 53). J. Neal

recognises that through the innovative introduction of social and systemic change, SE helps to address social disadvantages (Neal, 2010, p. 97).

As it follows from the premises of the National Programme for the Development of Social Economy (KPRES), the attention in the sector is primarily focused on persons at risk of social exclusion, meaning both workers striving to regain economic independence and subjectivity in terms of their professional situation, as well as persons who require special, individualized support in recovering their ability to participate fully in professional and social activity (*Krajowy program ekonomii społecznej...*, 2019, p. 17).

The concept of social exclusion is generally equated with poverty, social inequality, and widely noted discrimination. Social exclusion should be associated with expropriation from certain acquired rights or privileges, multidimensional deprivation, restitution, redundancy, irresponsibility, separation, alienation and marginality (Nowak, 2012, p. 19).

In recent years, social exclusion has become a major social issue, affecting those who, for various reasons, do not participate in social and professional life, preventing them from living a life of a fully-fledged citizen. L. Frąckiewicz defines social exclusion as an absence or limitation of the opportunities to participate, influence or benefit from basic public institutions and markets that should be available to all, especially to the poor, i.e. a situation which prevents or significantly hinders an individual or group from lawful engagement in social roles, use of public goods and social infrastructure, accumulation of resources or earning income in a dignified manner (Frąckiewicz, 2005, p. 11).

Hence, SE is an instrument by means of which independence and self-sufficiency of persons at risk of social exclusion may be restored. Given the degree of withdrawal from professional activity among working-age Poles, as well as the difficulties encountered to date in reaching people in adverse circumstances with effective support that produces lasting results, solutions in this area are necessary and should complement other mechanisms for a synergy effect to augment previously implemented initiatives (Ministerstwo Rodziny i Polityki Społecznej, 2021).

The solidarity economy is a particular area within SE whose essential task is the professional and social reintegration of persons at risk of social exclusion. Entities involved in the solidarity economy include Vocational Activity Establishments, Occupational Therapy Workshops, Social Integration Centres and Social Integration Clubs (Lewandowska, 2018, p. 41). Their reintegrative character consists in creating appropriate conditions for those persons who, for various reasons, are unable to fully participate in social and professional life.

A term that should be clarified at this point is 'reintegration', which means social inclusion construed as a process that allows persons at risk of exclusion to obtain the resources which ensure access to the labour market, culture, education, healthcare, etc.

The Social Employment Act (Ustawa z dnia 13 czerwca 2003 r. o zatrudnieniu socjalnym. Dz.U. z 2003 r., nr 122, poz. 1143) refers to two types of reintegration, namely social and professional. Social reintegration is a broader concept and describes the effort of enabling the participant of courses at a social integration centre or social integration club to recover or maintain their ability to participate in social life and function in the social roles of employees, family members, etc. Article 2(4) of said Act states explicitly that “social reintegration is understood as activities, including self-help activities, aimed at rebuilding and sustaining [...] the ability to participate in the life of the local community and fulfil social roles in the place of work, residence or stay”. Social exclusion tends to be narrowed down to exclusion from the labour market and its correlates. Meanwhile, irrespective of the situation in the labour market, it should be remembered that there will inevitably be a category of persons functioning outside the mainstream of social life: people affected by profound poverty, addictions, homelessness or struggling to readjust to social life following a prison sentence (Karwacki & Kaźmierczak, 2022, p. 7).

In turn, professional reintegration denotes activities aimed at rebuilding and maintaining the ability to perform work on the labour market in a person participating in courses conducted in specialized SE integration entities (Social Integration Clubs and Centres) (Krzyszowski *et al.*, 2018, p. 3). It may also be underlined that the integrated complex of services intended for persons affected by social exclusion in Poland is referred to as social and professional reintegration services. The latter term implies the goal, i.e. reintegration, understood as restoring the capacity of individuals and groups to perform social roles (e.g. self-reliant person, parent, neighbour, citizen), which naturally includes professional roles (the ability to undertake work) (Karwacki & Kaźmierczak, 2022, p. 7).

The purpose of the activities on the part of SE entities is related to the activation of persons excluded or at risk of exclusion. The broad spectrum of their undertakings is substantially important in economic terms (generating jobs, establishing new businesses and creating new forms of entrepreneurship) and in the social dimension (reinforcing democratic principles, counteracting social exclusion, developing and consolidating local communities) (Majzel *et al.*, 2021, p. 146).

Social Integration Centres

Social Integration Centres have a relatively short tradition in the economic and social space in Poland, occupying a particular place among social economy actors (Szarfenberg, 2015, p. 73).

The conditions for the emergence of CIS are related to the transformation of the Polish economy, which brought with it changes in the economy and politics.

At that time, a number of new problems emerged that Polish society had not faced before, or had encountered very rarely. A negative result of these changes has become the problem of multidimensional social exclusion, the extent of which has become a significant challenge for the Polish social economy. The insufficient results of the measures taken by social welfare institutions and labor offices forced the Polish legislator to look for an additional system to fill the gaps in the existing national legal order, which led to a new regulation of the system of social employment implemented by centers (Kawka, 2016, p. 205).

At the beginning of the 21st century, when the decision to create CIS was made, the key social problem in Poland was the high unemployment rate of about 20%. With almost half of the unemployed remaining out of the labor market for more than a year. The lack of employment opportunities translated into a low level of affluence in society indicating the need to intensify the efforts of various entities and institutions to create new jobs, including in social economy entities. The introduction in 2003 of the possibility of creating social integration centers created an opportunity for professional and multifaceted assistance to people at risk of social exclusion – those in difficult life situations, often cut off from real opportunities to return (or enter) the labor market.

The dynamically changing situation in the labour market and continued unemployment among persons situated furthest from the labour market, who often struggle with compounded problems in their lives, make it necessary to motivate socially excluded persons to undertake professional and social reintegration so as to develop appropriate attitudes to life and social roles both in the place of employment and residence, as well as restore their ability to perform independent work on the labour market; SICs were created to meet these very challenges (*Projekt ustawy o zmianie...*, 2021). Combining the activities specific to social and professional reintegration (of persons distant from the labour market) as part of SIC involvement was a certain novelty in Poland at the beginning (Goleński, 2019, p. 28). Operating at the interface of two key areas of social policy, i.e. social assistance and labour market policy, they have been counted among the most important reintegration actors within SE¹.

SICs were introduced into the legal order under the Act of 13 June 2003 on Social Employment (Ustawa z dnia 13 czerwca 2003 r. o zatrudnieniu socjalnym. Dz.U. z 2003 r., nr 122, poz. 1143). Early on, they were treated as auxiliary enterprises attached to social welfare centres. In 2009, following the amendment of the Public Finance Act, which provided for the liquidation of auxiliary enterprises as of 1 January 2011 (Ustawa z dnia 27 sierpnia 2009 r. o finansach publicznych, Dz.U. z 2009 r., nr 157, poz. 1240), their organisational

¹ SE reintegration entities include Vocational Activity Establishments, Occupational Therapy Workshops, Social Integration Centres and Clubs, all of which serve social and professional reintegration of persons at risk of social exclusion. These forms are by no means social enterprises, but may prepare one to run or work in a social enterprise, or be run by social enterprises as a service to the local community.

form was modified. Currently, they can only be established by entities specified in the statutory catalogue, such as local government units, non-governmental organizations or ecclesiastical legal persons and their organizational units.

In 2021, a total of 201 social integration centres were in active operation in Poland, providing social and professional integration services to 11,600 participants. Compared with the preceding year, their number increased by eight centres, whereby the most substantial increase was observed in the Śląskie (from 26 to 30) and the Mazowieckie (from 6 to 10) voivodeship. Relative to 2020, the number of participants increased by 12.1% (10,400 in 2020). In 2021, the average amounted to 58 participants per SIC (in 2020, the average was 54 persons) (*Centra integracji społecznej...*, 2022). Most SICs were located in the following voivodeships: Śląskie (14.9%), Wielkopolskie (12.9%) and Pomorskie (10.0%). On the other hand, the highest saturation of SICs in relation to the number of inhabitants in a given region was recorded in Lubuskie, with 1.7 such establishments per 100,000 inhabitants, while the national average was 0.5 (Fig. 1).

As may be gathered from the data distribution in Map 1, SICs are unevenly located throughout the country, which is due to a number of factors. The differences in the distribution of such entities in particular voivodeships result from

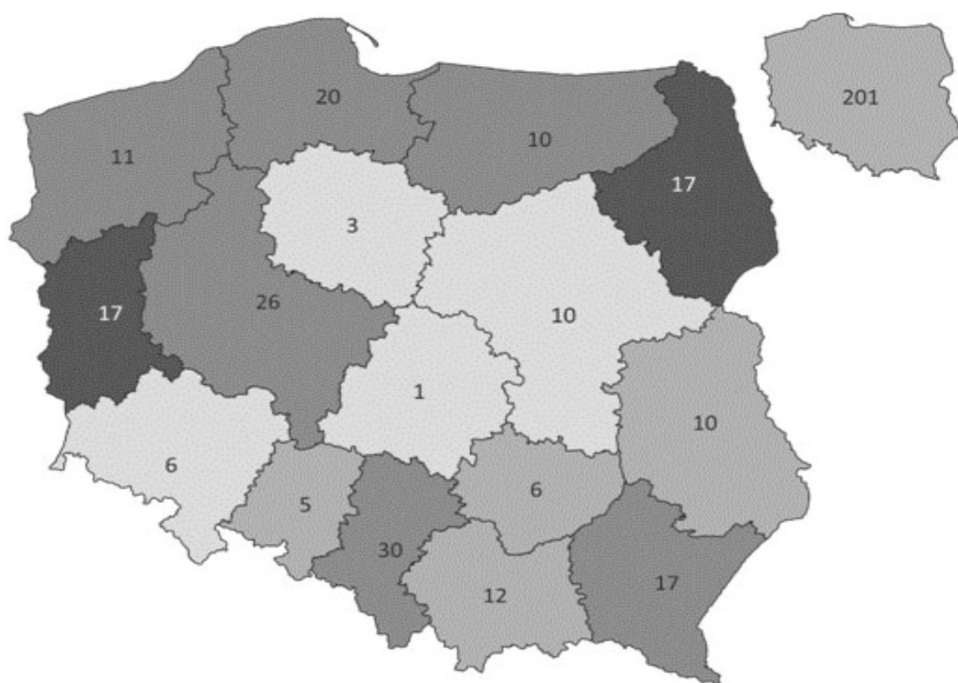


Fig. 1. Social integration centres by voivodeship in 2021

Source: Statistics Poland (2022). Social integration centres, social integration clubs, vocational activity establishments, and occupational therapy workshops in 2021.

different financing modalities, as well as from regional traditions of community life and social activism (*Krajowy program rozwoju ekonomii...*, 2021, p. 85). The territorially differentiated distribution of Social Integration Centers is also related to the uneven development of the potential of the social economy sector in different regions of the country.

An analysis of data from Statistics Poland shows that between 2015 and 2021, the number of SICs increased steadily, which reflects the continuing need to activate the long-term unemployed who receive social assistance, especially in the areas where unemployment still exceeds the national average; the possibility of financing new SICs from EU funds (ESF) also plays a role.

In that period, 61 SICs were established, an increase of 43.6% (Fig. 2). The outbreak of the COVID-19 pandemic did not have a significant impact on the functioning of those entities. Although SICs were compelled to considerably reduce their activities during the pandemic, their participants were still able (often online, using a learning platform) to benefit from “the provision of services for social and professional reintegration [...] Staying in quarantine or isolation at home was an extraordinary circumstance which was independent of the participants’ will, while the integration benefit was often their only source of income”, as emphasized by the Minister of Family and Social Policy M. Maląg (Ministerstwo Rodziny i Polityki Społecznej, 2021).

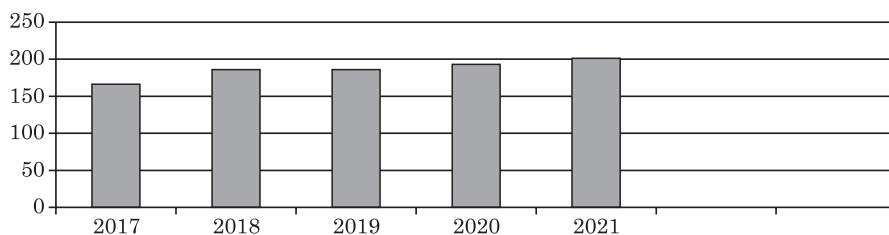


Fig. 2. The number of SICs in 2017-2021

Source: compiled by the author based on Statistics Poland (2022). Social integration centres, social integration clubs, vocational activity establishments, and occupational therapy workshops in 2021.

It is underlined in a report by the Supreme Audit Office that “the essential activity of SIC, consisting of social and professional reintegration of persons whose opportunities on the open labour market are the lowest, due to inferior qualifications or lack thereof as well as due to issues relating to full participation in social and professional life. Among other things, their aim is to counteract the dependence of benefit recipients on financial social security systems and solve the problem of unemployment and improvement of professional qualifications among persons at risk of exclusion” (*Zatrudnienie socjalne jako...*, 2013, p. 6).

For several years, the demographic of SIC participants has remained unchanged, as they are most frequently attended by the long-term unemployed, who account for 37.5% of all recipients of services provided by SICs, though

the share of this group decreased by 3.1% compared to 2020. According to M. Danecka and S. Nałecz, the long-term unemployed are the relatively most promising group with respect to the successful completion of the social and professional reintegration process (Danecka & Nałecz, 2007, p. 186). Subsequently, persons addicted to alcohol or psychoactive substances (15.5%) and persons with disabilities (12.6%) benefit from SIC support. On the other hand, persons for whom the main reason for exclusion is homelessness (6.3%) or mental condition (Fig. 3) constitute a small proportion of the SIC beneficiaries.

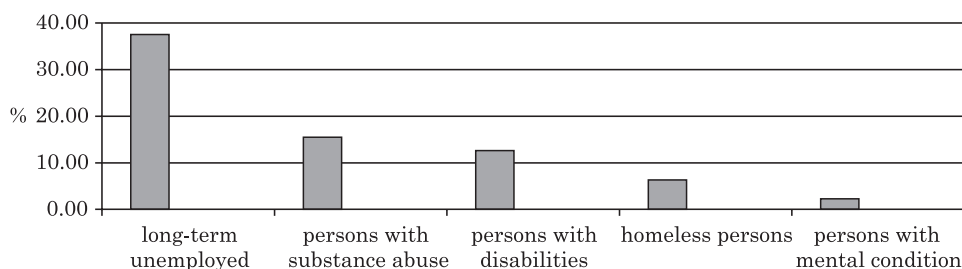


Fig. 3. Participants of SIC social employment

Source: compiled by the author based on Statistics Poland (2022). Social integration centres, social integration clubs, vocational activity establishments, and occupational therapy workshops in 2017-2021.

The analysis of data from Statistics Poland shows that the increased number of operating SICs does not translate significantly/substantially into a higher number of participants (Fig. 4), which has remained at a similar level for years. Moreover, the decline in unemployment, decreasing number of social assistance beneficiaries or the changing economic realities do not significantly influence a higher/lower number of participants. On average, there are 60 participants per SIC. The total number of participants attending social and professional reintegration courses conducted at SICs increased from over 11,500 in 2017 to 12,100 in 2018, only to decrease in the following years to 11,100 persons in 2019 and 10,400 in 2020, prior to rising again to 11,600 in 2021.

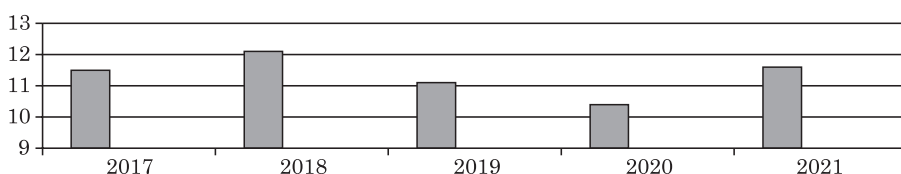


Fig. 4. Number of SIC participants in the social and professional reintegration framework in 2017-2021 (in thousands)

Source: compiled by the author based on Statistics Poland (2022). Social integration centres, social integration clubs, vocational activity establishments, and occupational therapy workshops in 2017-2021.

Pursuant to the Act on Social Employment, refugees are also entitled to SIC services if their life situation prevents them from independently satisfying their elementary needs and participating in professional, social, and family life or when their participation in these spheres of life is limited for various reasons. They follow an individual integration programme within the meaning of the social assistance law (Ustawa z dnia 13 czerwca 2003 r. o zatrudnieniu socjalnym. Dz.U. z 2003 r., nr 122, poz. 1143, art. 1 p.7). The various refugee groups currently in the country include citizens of Ukraine staying in Poland as a result of the war waged on the territory of their country, who most often participate in the activities organized by SICs. Between 24 February and 2 October 2022², between 80 and 524 Ukrainian citizens (325 persons on average) participated in reintegration at SICs. Their share in the analysed period ranged from 1.8% to 9.3% of all SIC participants (*Centra integracji społecznej...*, 2022, p. 4).

The essential task of the centres is to implement a multi-level social employment programme to mitigate poverty and social exclusion. The catalogue of persons subject to social exclusion (the homeless, persons with substance abuse, persons with mental conditions, the long-term unemployed, persons released from penal institutions, refugees, and persons with disabilities) can always be extended to include other categories of persons who are in a special situation on the labour market and have limited opportunities to function in social and professional life (Borowski *et al.*, 2014, p. 8). The Act defines them as “persons who are subject to social exclusion, incapable of satisfying their basic existential needs through their own efforts due to their life situation and find themselves in a situation which results in poverty and prevents or restricts their participation in professional, social and family life” (Ustawa z dnia 13 czerwca 2003 r. o zatrudnieniu socjalnym. Dz.U. z 2003 r., nr 122, poz. 1143).

A characteristic feature of professional reintegration carried out by SICs is that its beneficiaries participate in various forms of employment, whereby the conditions resemble the actual workplace. The participants are not party to an employment contract and do not receive remuneration within the meaning of the labour law³, as no such employment relationship is established between them and SICs. As a result, they continue to be registered with the authorities as unemployed, receiving the integration benefit, which is perceived as a form of unemployment benefit. As part of professional reintegration, SICs offer vocational retraining (courses, training), practical classes and courses in starting

² The data originates from an additional survey carried out in 10 measurements by the Ministry of Family and Social Policy, in view of the involvement of SICs in assisting Ukrainian citizens. The actual total number of Ukrainian citizens who receive support from the CISOs cannot be stated, as one person may have been reported repeatedly in several measurements.

³ Social employment does not constitute employment as defined by the Labour Code. The work is a form of professional placement combined with various types of training and support to resolve the issues which contributed to e.g. long-term unemployment; however, it counts towards seniority, as the relevant social insurance contributions are paid on integration benefits.

and running a business, with particular emphasis on the operating principles of social cooperatives. One of the components of the vocational curriculum is running a business involving services, commerce or manufacturing, the revenue from which may provide additional funds for the operation of a given SIC⁴.

Participation in the courses conducted by the centres may take place at the request of the interested person, but they may also be referred to a SIC by a substance rehab centre, district family assistance centre, district labour office, social assistance centre, non-governmental organization or social integration club, with the consent of the person in question or their legal representative. It is the prerequisite for the person wishing to participate in SIC activities to conclude the Individual Social Employment Programme. This programme involves observation and assessment of changes in one's professional and social situation (Kawka, 2016, p. 207). It is drawn up individually with each SIC participant and demonstrates certain features of a contract, as it must be signed by two parties to the legal relationship, i.e. the participant and the head of the

Table 1

Systemic and individual goals pursued by SICs

Systemic goals	Individual goals
Comprehensive provision of assistance to persons at risk of social exclusion based on the developed and subsequently implemented individual programmes of social and professional integration	mitigating the risk of social exclusion through the opportunity to acquire new professional qualifications
Introduction of an appropriate support and assistance system dedicated to the participants	material and psychological support for excluded persons and their families as they overcome difficult life situations with which they are unable to cope on their own
Animation of the local environment to support people excluded and at risk of social exclusion	social integration and activation by motivating individuals to change their current lives and by enabling the participants to develop and improve social or personal skills so that they may function in society without hindrance
Application of various activities resulting in the improvement of life circumstances of the SIC participants and their families	integration with the community for persons leaving penal institutions; homeless persons involved in the individual programme of leaving homelessness; persons addicted to substances (upon completion of psychotherapy programmes)

Source: own elaboration on the basis of Borowski *et al.* (2014).

⁴ As part of professional reintegration, a centre may engage in manufacturing, trade or services, as well as production in the agricultural sector, with the exception of enterprise consisting in the production of or trade in products of the fuel, tobacco, spirit, wine, beer industries, as well as other alcoholic products with alcohol content exceeding 0.5%, as well as products made of precious metals or involving such metals as components, in accordance with Article 9.1 of the Act on Social Employment.

centre (Stachowicz & Żołędowska, 2020, p. 41). The implementation of the social employment programme focuses on empowering persons affected by dysfunctions, at risk of or subject to social exclusion through professional and social education with a view to that person achieving economic independence on their own; also, it prioritizes general social prevention and the creation of institutional mechanisms that enable the employment and related professional readjustment and social integration of such persons (Centrum Integracji Społecznej Rumia, 2018).

In relation to persons excluded or at risk of exclusion, SICs aim to achieve systemic and individual goals concurrently.

It is fundamental for successful reintegration that the process of social and professional reintegration takes place simultaneously. Through activities aimed at increasing professional and social activity, SICs help to develop the abilities that beneficiaries will need in their later professional career (Kawka, 2016, p. 222). It is also worth noting that empowerment, i.e. the subjectification of the participants, is crucial at SICs. To that end, the participants are invited to contribute to their own individual social employment programme. SICs teach new methods of acquiring professional qualifications and key skills such as teamwork and self-direction, which is why their activities are also inherently educational. The courses include various types of workshops and specialized training sessions in which the participants have the opportunity to acquire new qualifications as well as supplement or increase their existing professional skills. The centres can also organize traineeships and work placements with selected employers (Koral, 2008, p. 2).

Table 2

Professional reintegration services

Professional reintegration methods			
Professional retraining, acquisition of new vocational qualifications (courses, training)	developing effective job-seeking skills	practical instruction (workshops, traineeships)	courses in running a business, taking into account the operating principles of social cooperatives

Source: own elaboration on the basis of Borowski *et al.* (2014).

There is no doubt that over the 18 years of their presence in Poland, SICs have adequately filled the gap in the system of services provided by social policy institutions, which thus far have not catered to persons with low basic skills to such an extent. Their outstanding characteristic is their holistic approach that spans various spheres in the lives of the participants, from psychological, social and legal issues, to addressing educational and professional deficits (*Informacje dla instytucji...*, 2005, p. 2).

Conclusions

The above demonstrates that reintegration entities occupy an important place among all SE actors. They perform a vital function in activating and reintegrating people who, without extensive support, remain outside the labour market and their participation in social life is limited. According to the provisions of the KPRES-in a perspective until 2030-all activities of SICs should be planned in a manner which allows for a comprehensive approach to reintegration. Depending on the individual needs of people at risk of social exclusion, the reintegration process may continue after their SIC participation has ended, enabling practical implementation of reintegration paths and a smooth transition from exclusion to social and professional activity (*Krajowy program rozwoju ekonomii...*, 2021, p. 37).

Social Integration Centres have recently proven to be an enduring and significant entity within SE. Thanks to a multi-level system of social and professional integration dedicated to socially excluded persons, they become major centres of local activation. Their invariable goal is to strive for a higher level of social and professional performance of individuals facing potential exclusion. The assistance provided by the centres continues to include new categories of people and encompasses ever broader groups of recipients of such services (which, among other things, follows by way of response to social change).

The analysis of pertinent research and literature indicates that centres, as institutions implementing specialized programmes of work with persons excluded or at risk of exclusion, make a substantial and unquestionable contribution to the pursuit of active social policy in this area (Ciepielewska, 2011, p. 4). Activities aimed at the parallel accomplishment of individual and systemic goals serve to increase the professional and social activity of the participants. Ultimately, through social and professional reintegration, the SIC participants obtain an opportunity to become self-reliant and independent of state support systems (e.g. social welfare institutions). It follows from the analysis that over the years, the centres have consistently implemented a specialized work programme for those who are socially excluded or at risk of exclusion. The support system based on reintegration activities is multifaceted, thanks to which the SIC beneficiaries have the opportunity to acquire or improve their professional qualifications and social competence. As reintegration entities, they effectively bridge the gap between the social assistance system and the labour market, playing a leading role in the fight against social exclusion.

The available data collected by Statistics Poland or the Ministry of Family and Social Policy clearly shows that the number of centres in Poland has been systematically growing in recent years. They develop as one of the solutions within the system of active social policy, owing to the need to activate the unemployed – often beneficiaries of the social welfare system – especially in those regions of Poland where unemployment is still higher than the national average.

The centres focus on seeking the structured provision of new forms of social and professional activation to the residents in such regions, taking advantage of the financing opportunities available through EU funds. The types, forms and range of services offered by the centres are informed by the nature of the social economy, in which the emphasis is put on supporting and activating persons who are subject to the exclusion processes. As a result, the diverse human needs, deficits and inadequacies make it necessary to continuously expand the range of integrative services provided by entities in this sector. In modern societies, each individual should be able to meet their needs and realize their own individual aspirations and goals in life. If a person is unable to do this on their own and through their own efforts, the state should create other opportunities for their benefit. One of these is precisely the assistance available within SE, with its range of services oriented towards social and professional reintegration.

The primary function of the centres is to counteract exclusion in the field of professional and social activity. In order to mitigate exclusion effectively, it is necessary to devise and implement comprehensive and individualized forms of support in the form of active inclusion services. The effort to identify and apply effective activation tools with persons requiring such support reveals how complex these issues are and shows that a more profound diagnosis with respect to social inclusion is indispensable (*Analiza sytuacji wewnątrzregionalnej...*, 2019, p. 90).

Further development of the centres largely depends on the extent to which this form of activity results in actual benefits to its participants, as well as to society as a whole. Moreover, any undertakings to support the development of SICs should be planned in a way which facilitates a comprehensive approach to the reintegration of people at risk of social exclusion. Such an approach will enable the practical implementation of reintegration pathways and a smooth transition from exclusion to social and professional activity.

Translated by Joanna Jensen

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PERSPECTIVES FOR ENERGY DEVELOPMENT IN POLAND AND IN THE EUROPEAN UNION IN THE CONTEXT OF THE EUROPEAN GREEN DEAL: RENEWABLE ENERGY AND ENERGY EFFICIENCY

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Key words: European Green Deal, energy transition.

Abstract

The European Green Deal is a development strategy which aims to transform the European Union into a climate-neutral area by 2050. Due to the scale of reforms it envisages, it is considered the largest legislative initiative in the history of the European Union. The research aims to analyse the prospects for energy development in Poland and in the European Union in the context of the European Green Deal, with a particular focus on potential ways to increase the share of renewable energy sources and improve energy efficiency.

Given the highly disparate environmental and socio-economic conditions, a number of EU countries will find it challenging to meet the ambitious requirements of the European Green Deal. Additionally, considering the huge impact of the Coronavirus pandemic and the war between Russia and Ukraine, the use of a sustainable energy security concept seems justified, as it takes into account the socio-technical specificities of individual states. A predictable energy and climate policy consistent with the EU's objectives may facilitate Poland's fair transition towards sustainable development.

**PERSPEKTYWY ROZWOJU ENERGETYKI W POLSCE I W UNII EUROPEJSKIEJ
W KONTEKŚCIE EUROPEJSKIEGO ZIELONEGO ŁADU –
ENERGIA ODNAWIALNA I EFEKTYWNOŚĆ ENERGETYCZNA**

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Słowa kluczowe: Europejski Zielony Ład, transformacja energetyczna.

A b s t r a k t

Europejski Zielony Ład jest strategią rozwoju, która ma przekształcić Unię Europejską w obszar neutralny klimatycznie do 2050 roku. Z uwagi na skalę zakładanych w nim reform jest uznawany za największą inicjatywę legislacyjną w historii Unii Europejskiej. Celem badań jest analiza perspektyw rozwoju energetyki w Polsce i w Unii Europejskiej w kontekście Europejskiego Zielonego Ładu, ze szczególnym uwzględnieniem potencjalnych sposobów zwiększenia udziału odnawialnych źródeł energii i poprawy efektywności energetycznej.

Z uwagi na bardzo zróżnicowane uwarunkowania środowiskowe i społeczno-ekonomiczne wiele krajów UE będzie miało duże problemy ze spełnieniem ambitnych założeń Europejskiego Zielonego Ładu. Uwzględniając dodatkowo ogromne skutki pandemii COVID-19 oraz wojny rosyjsko-ukraińskiej, uzasadnione wydaje się wykorzystanie koncepcji zrównoważonego bezpieczeństwa energetycznego, uwzględniającej społeczno-techniczne uwarunkowania poszczególnych krajów. Przewidywalna i zgodna z unijnymi celami polityka energetyczno-klimatyczna może ułatwić Polsce przeprowadzenie sprawiedliwej transformacji w kierunku zrównoważonego rozwoju.

Introduction

The concept of sustainable development has been incorporated into the strategy of the European Union through the Treaty of Amsterdam. In order to implement its principles in practice, it requires, first and foremost, the efficient use of energy resources (Vasylieva *et al.*, 2019; Semenenko *et al.*, 2019; Bilan *et al.*, 2019). Since having access to these resources has a fundamental impact on the processes taking place in the socio-economic space, they are a hotbed of regional conflicts (see Belyi, 2015). Such circumstances have forced the international community to adopt a new path of global development through sustainable energy. Like the term “sustainable development”, this concept is based on three pillars: stable economic development, environmental protection and meeting social needs (see Balcerzak & Pietrzak, 2017; Wierzbicka, 2022).

The European Green Deal, with the main objective of achieving EU climate neutrality in 2050, has become an extremely ambitious development within the concept of sustainable energy. It was announced by the European Commission in 2019, just a few months before the outbreak of the COVID-19 pandemic.

The pandemic triggered a significant socio-economic crisis across the European Union, despite engaging large amounts of financial support from national budgets. In order to provide additional support to Member States affected by the COVID-19 pandemic, the European Commission has launched a temporary EU Recovery plan (Next Generation EU) (European Commission, 2019). The largest part of the Recovery Fund is the Recovery and Resilience Facility (RRF). Parts of the RRF programme changed as a result of Russia's invasion of Ukraine in 2022. To reduce the EU's dependence on Russian fossil fuels, the European Commission decided to accelerate the spread of renewable energy, diversify supply and reduce energy demand (see REPowerEU, 2022). The EGD (European Green Deal), which is currently taking shape as part of the 'Fit for 55' package, envisages, among other things, a reduction in greenhouse gases of at least 55% in 2030 compared to 1990 (REPowerEU, 2022).

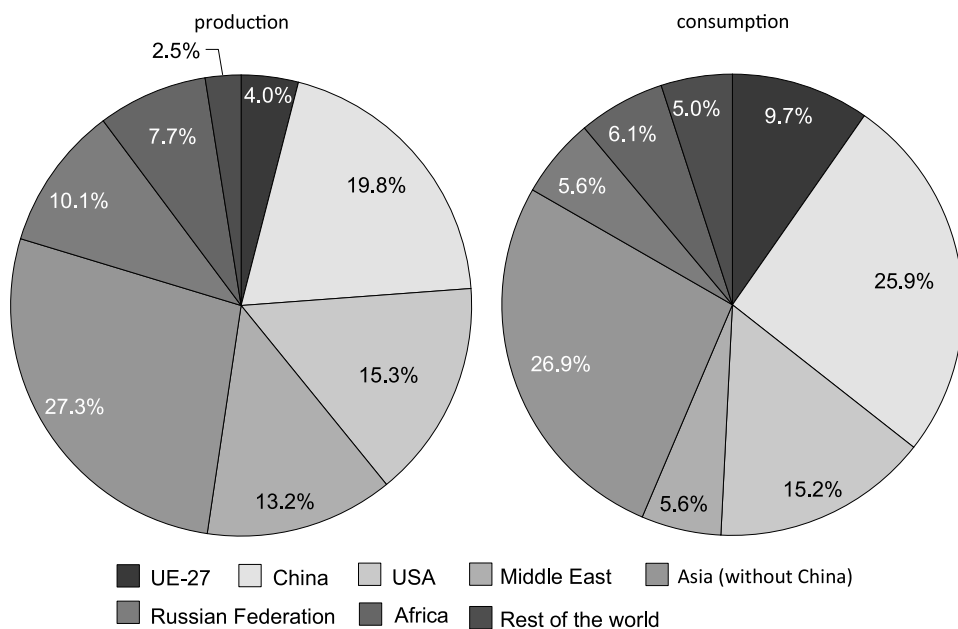


Fig. 1. Global structure of energy production and consumption worldwide (2020)

Source: own compilation based on: *EU energy in figures. Statistical Pocketbook* (2022).

One of the most challenging issues surrounding Europe's energy transition is the EU's very high dependence on imports of energy carriers. In 2020, 97% of the EU's demand for crude oil and petroleum products was satisfied by imports, and likewise, 83.6% of natural gas was also imported. At the EU level, 35.8% of solid fossil fuels were imported in 2020. The long-term trend observed since 1990 has shown an increasing dependence of the EU on imports of energy carriers. While 57.5% of all fuels consumed were imported in 2020, the share stood

at 50% in 1990. The EU's significant energy dependence is also evidenced in the comparison of the EU's contribution (4.0%) to global primary energy production with the EU's share of energy consumption (9.7%) (Fig. 1). This dependence upon external energy resources largely explains the EU's commitment to the practical implementation of the EGD targets. This is manifested mainly in an effort to increase the energy efficiency of the macro-sectors of EU economies and to increase the use of renewable energy sources.

Since 2007, the European Union has approved a climate and energy package (the so-called 3×20) requiring Member States to achieve specified quantitative targets, including greenhouse gas emissions and energy production from renewable sources (RES) (see Kasperowicz *et al.*, 2017).

In 2014, the EU continued its direction on climate change and set four targets in the 2030 perspective, which after revisions in 2018 and 2020, are as follows:

- a reduction in greenhouse gas (GHG) emissions of at least 55% compared to 1990 emissions;
- at least 32% share of renewable sources in gross final energy consumption;
- an increase in energy efficiency of 32.5%;
- completion of the EU internal energy market.

Against this background, the objective of the study is to analyse the perspectives for energy development in Poland and in the European Union in the context of the European Green Deal, with particular reference to the possibility of increasing the share of renewable energy sources and improving energy efficiency.

The remainder of this paper is an attempt to diagnose the current state and prospects for the development of the energy sector in Poland and the EU in the context of the objectives of the European Green Deal.

Overview of the Energy Situation in the European Union

Between 2000 and 2020, final energy consumption increased globally by 36% to reach 9,573 Mtoe. The largest increase in final energy consumption in the corresponding period was seen in China (177%), while energy use in the EU decreased by 6.2%. Poland was one of the few EU countries where final energy consumption has increased since the beginning of the century (by 31%). This increase in energy demand in Poland was a natural consequence of economic growth. At the same time, it is worth noting that the value of Poland's energy efficiency indicator¹ increased by more than 71% in 2020 compared to 2000, while the EU average productivity increased by 37%. Still, Poland's energy efficiency represents only 55% of the EU average.

¹ The final efficiency indicator was calculated as the ratio of the volume of annual GDP to the amount of final energy consumed.

Disparities are also observable in the structure of gross energy consumption in Poland in relation to that in the entire EU27 (Figs. 2 and 3). Between 1995 and 2020, the dominant energy carrier in gross energy consumption in Poland was solid fossil fuels, with a share of 40.1% in domestic consumption in 2020. From the point of view of the objectives of the European Green Deal, a positive trend is the increasing use of energy from RES, which accounted for 12.7% of gross energy consumption in 2020 (Fig. 3). By comparison, the share of renewables in EU gross energy consumption was 17.5%, while solid fossil fuels were only 10.2%.

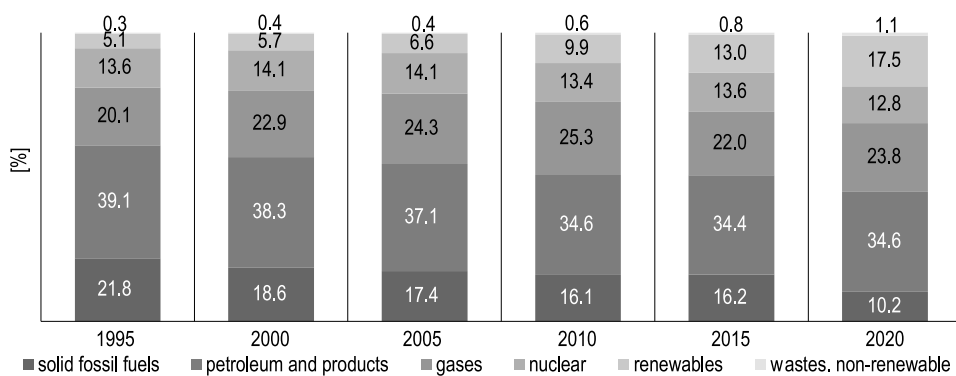


Fig. 2. Share of individual energy carriers in gross energy consumption in the EU 27
Source: own compilation based on Eurostat data.

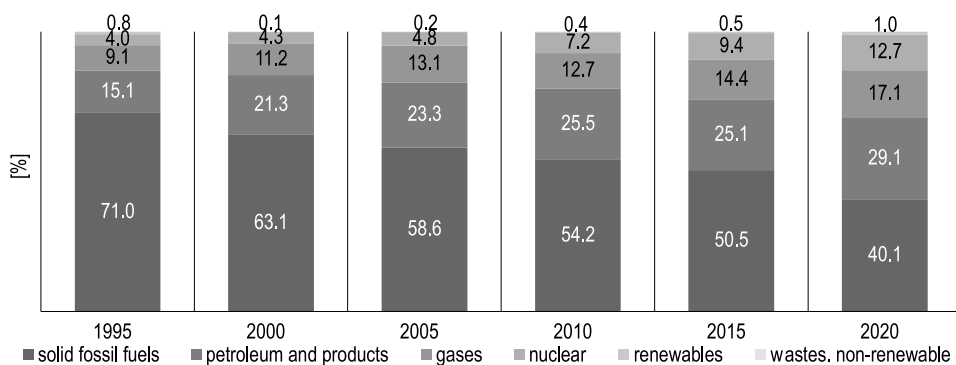


Fig. 3. Share of individual energy carriers in gross energy consumption in Poland
Source: own compilation based on Eurostat data.

Juxtaposing the share of selected countries in the consumption of a given energy carrier in the EU27 with the share of that particular state in total gross energy consumption of the EU27 makes it possible to assess the degree of dependence of a national economy on a given energy source. A graphic depiction of these dependencies is provided in Figure 4, where the selected EU member

states are shown in the form of a hexagon. The vertices symbolise the energy carriers, while the distance from the central point reflects their significance for the domestic energy systems. Analysis of the consumption profile of energy carriers in Poland indicates a gradually diminishing role of solid fossil fuels as an energy source. By contrast, the position of crude oil, natural gas and RES in the consumption structure of the major energy sources has increased over the past two decades. Among the reviewed states, Germany is characterised by the most multidirectional consumption profile of the key energy carrier groups. In France, on the other hand, nuclear energy is the main source of energy, accounting for 75% of the energy consumed in the state (Fig. 4).

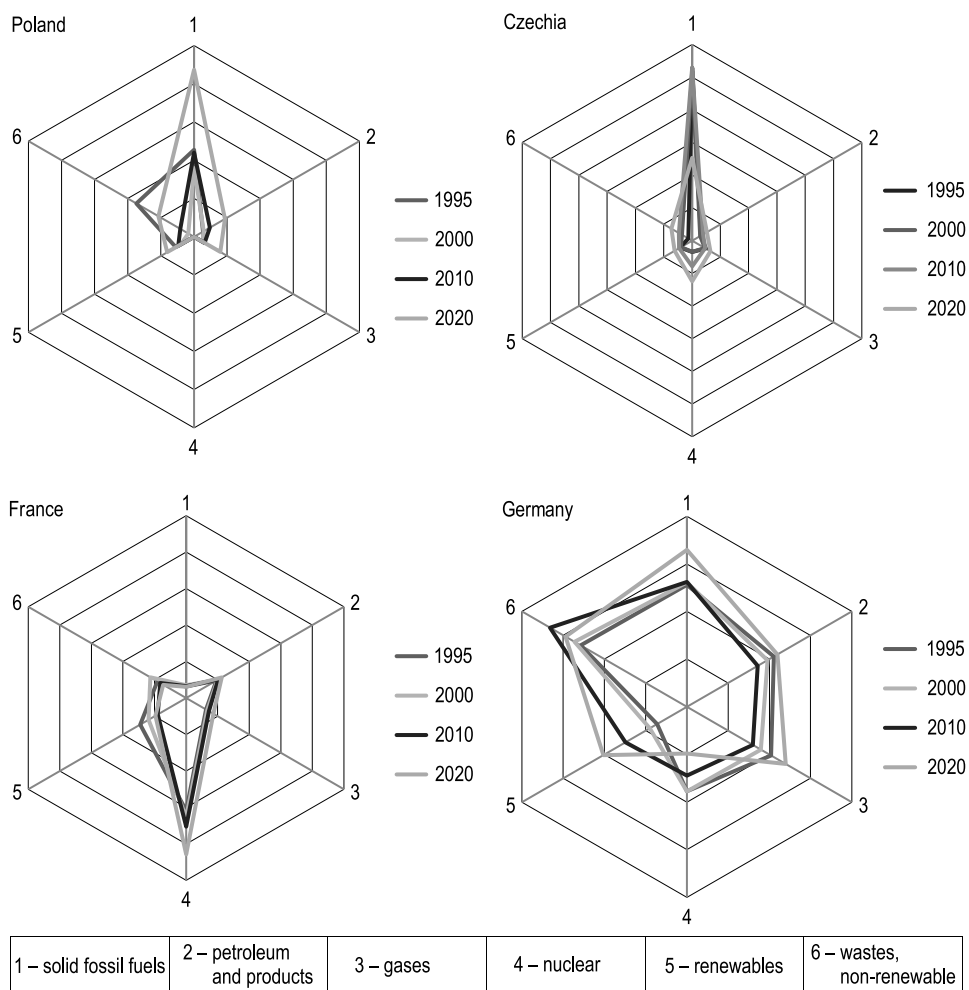


Fig. 4. Graphical overview of the consumption profiles of energy carriers in selected EU states, 1995-2020

Source: own compilation based on Eurostat data.

There were several developments in final energy consumption across macro-sectors in the EU over the analysed period. The industrial sector reduced its final energy demand in 2020 by 30.3% compared to 2000. A decrease in energy consumption was also observed in the household sector (by 21.8%) and in transport (by 27.1%). In 2020, transport accounted for the largest share of final energy consumption in the EU27 (29.6%), closely followed by private consumers (29.1%) and industry (27.1%) (Fig. 5). When analysing the data for 2020, it is essential to consider the COVID-19 pandemic, which significantly affected the volume and structure of energy consumption in the EU. The overall trends over the entire period under review reflect primarily structural changes in the EU economy, i.e. a departure from an energy-intensive economy and an ever-increasing share of services.

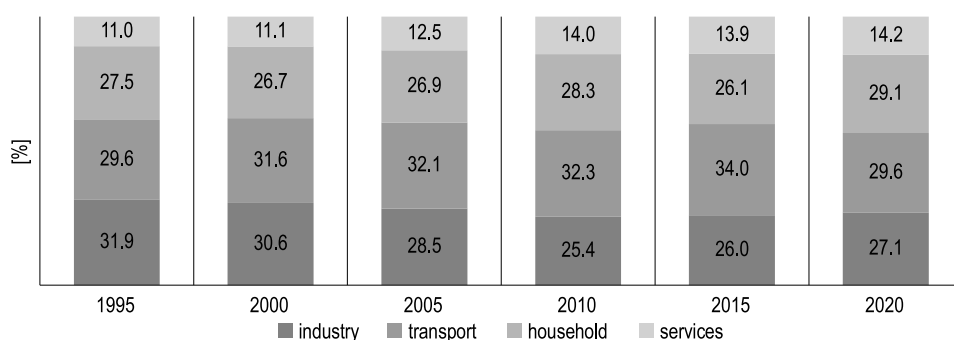


Fig. 5. Structure of final energy consumption by sector in the EU27

Source: own compilation based on Eurostat data.

Unlike in the EU, there have been fundamental changes in energy consumption in individual macro-sectors in Poland. First of all, it is necessary to emphasise the more than twofold increase in final energy consumption in the transport sector (by 119.5%), which accounted for 32.9% of total final energy consumption in Poland in 2020. As with the EU average, energy demand in Poland also

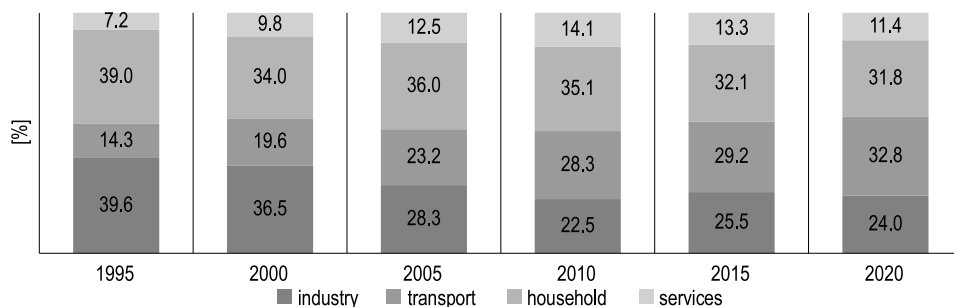


Fig. 6. Structure of final energy consumption by sector in Poland

Source: own compilation based on Eurostat data.

increased in the services sector (by 23.6%) and decreased in industry by 30.7%. Polish households are one of the largest energy consumers, and this sector has the greatest potential for reducing energy consumption (Fig. 6).

Energy Efficiency in EU Countries

The issue of energy efficiency is treated in the EU as one of the three strategic objectives of the European Green Deal. The energy intensity of a national economy can be measured by the ratio of both primary and final energy consumption to the corresponding volume of production (measured by the level of GDP) (see Kasman & Duman, 2015).

Currently, the energy intensity of the Polish economy is estimated to be almost twice as high as the European average (Fig. 7). However, it should be stressed that over the last two decades, the energy intensity of Poland's final GDP has almost doubled. In 2000 it was 363 kgoe/1,000 euro, while in 2020 it was 212 kgoe/1,000 euro. Positive trends in energy efficiency in Poland are also confirmed by changes in the value of final efficiency indicators between 2000 and 2020. The gross energy efficiency of Poland's GDP, expressed in constant 2010 prices, stood at 4.7 euro/kgoe in 2020 and was 71% higher than in 2000 (2.7 euro/kgoe). If purchasing power parity is taken into consideration, Poland's energy efficiency increased by 122% over the analysed period, and the rate of improvement in this efficiency was higher in Poland than in the European Union (Fig. 8).

Proportion of Energy from Renewable Sources

The Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources (2009/28/EC) has been in force in the EU for more than 15 years. By 2020, 20% of final energy consumed across the EU was supposed to come from renewable sources, with different target percentages assigned to individual Member States. These targets were set at such a level that, on the one hand, they were realistic to achieve and, on the other hand, incentivised individual states to increase their RES share (see Scarlat *et al.*, 2015).

Overall, the EU27 had a 22% RES share in final energy consumption in 2020, and of the 27 countries, 23 exceeded their targets. Only France failed to meet its target of 23% RES share of final energy consumed (Fig. 9).

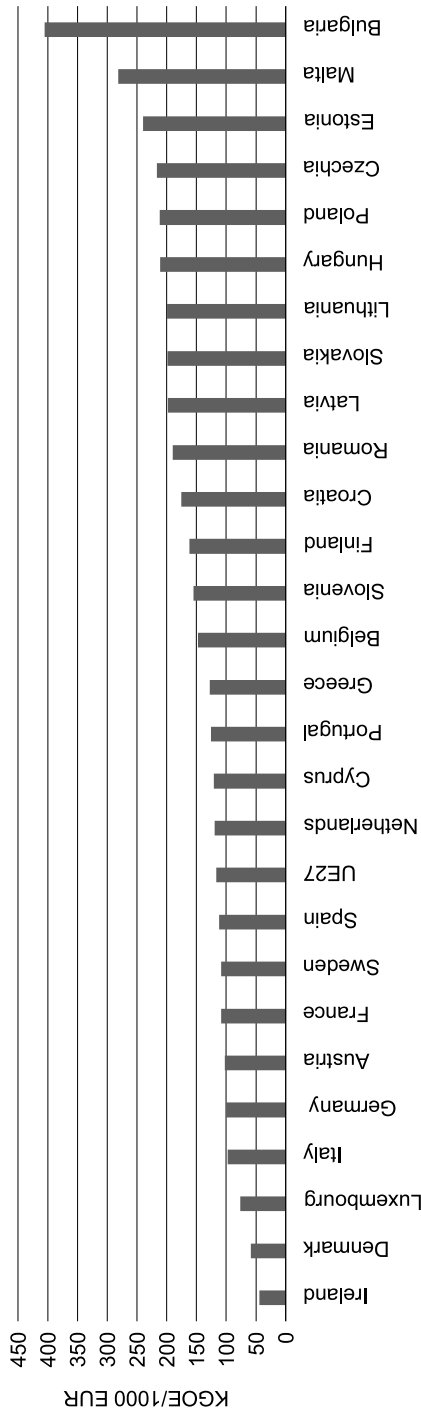


Fig. 7. Final energy intensity of GDP of EU economies in 2020 (energy intensity of the economy – expressed as a ratio of energy consumption to GDP, at market prices)

Source: own compilation based on Eurostat data.

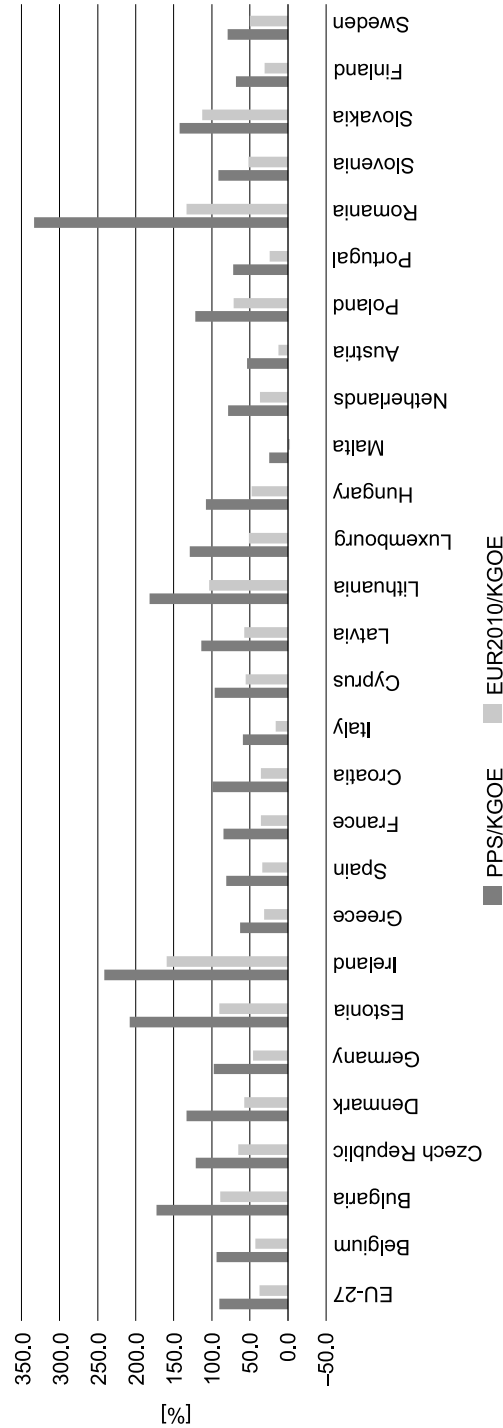


Fig. 8. Evolution of energy efficiency in EU countries 2000-2020
Source: own compilation based on Eurostat data.

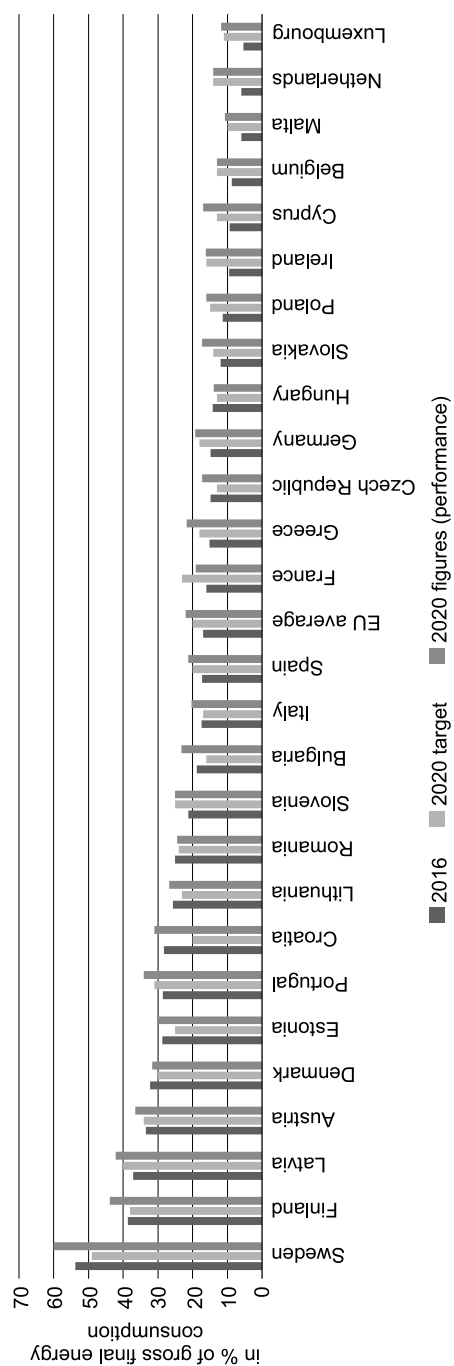


Fig. 9. Share of RES in EU27 in 2020

Source: own compilation based on Eurostat data.

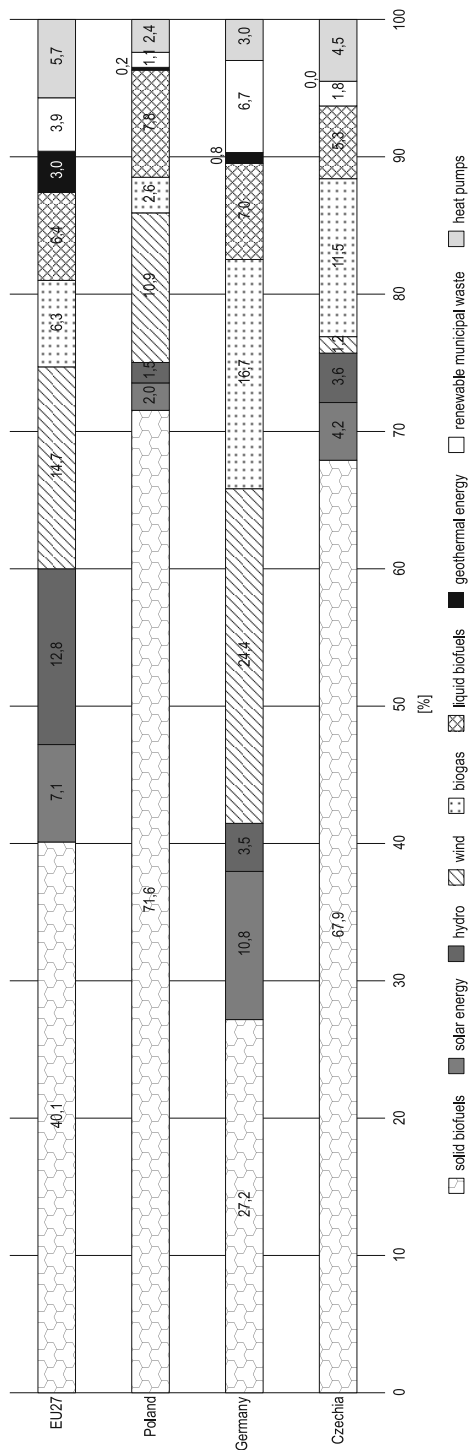


Fig. 10. Structure of energy generation from renewable sources (by carrier) for Poland, the EU27 and selected Member States
Source: own compilation based on Eurostat data.

The structure of renewable energy generation (by source) in the EU27 and Poland in 2020 is shown in Figure 10. The structure of renewable energy generation for Poland differs fundamentally from the structure of RES sources for the EU27. Similar to other states (Czechia), this structure stems primarily from the geographical conditions specific to Poland and the resources that can be utilised.

Solid biofuels dominated the production of energy from renewable sources in Poland, accounting for up to 71.6% of energy production from RES in 2020. In the period under review (2005-2020), the share of wind energy increased from 0.3% to 10.9%, solar energy went from almost zero to 2% and liquid biofuels (bioethanol plus biodiesel) from 2.6% to 7.8%. In absolute terms, the largest increase in the use of renewable energy was seen in the case of wind energy. By 2020, more than 7,300 wind turbines with a total capacity of nearly 7,400 MW had been installed in Poland, representing approximately 17% of the country's installed energy capacity. Comparing the structure of RES energy consumption for Poland and selected EU countries (Germany, Czech Republic) helps to view the shortcomings of adapting the structure of RES production and consumption in Poland to the natural and economic conditions of the country, which should also be associated with the weaknesses of state policy in supporting the development of renewable energy (see also Szyja, 2016). In Western states (Germany), biogas production is being intensively developed, which proves to be more efficient in many EU countries than other RES carriers, e.g. wind or solar energy (see Scarlat, 2018).

The extent of renewable energy use in individual sectors is also of key significance. Figure 11 shows the share of RES in three sectors for the period 2005-2020.

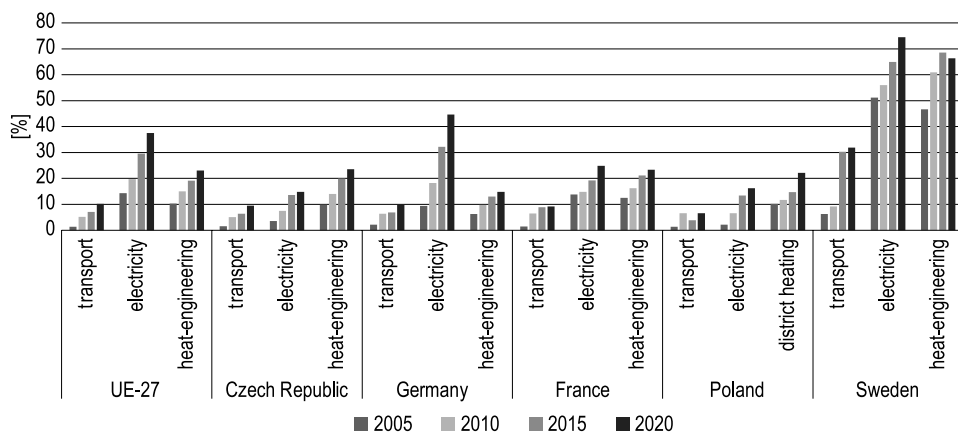


Fig. 11. Share of RES in gross final energy consumption by sector in selected EU states
Source: own compilation based on Eurostat data.

During the period under review, the share of RES was increasing in all sectors considered, but the largest share was found in district heating. In 2020 in Sweden, for example, 66% of thermal energy came from renewable sources, with as much as 75% of electricity coming from this source. Similarly, renewable energy in Poland is used primarily in electricity generation and district heating. Renewables are used to a relatively smallest extent in transport, which is dominated by traditional energy carriers. For this reason and given the projected increase in this sector's contribution to national GDP, increasing the use of RES to power transport modes is going to be one of the greatest challenges for the EU's Green Deal.

Summary and Conclusions

The European Green Deal is an ambitious European Union action plan designed to accelerate Europe's transition towards a sustainable, green and fair society. As part of the European Green Deal, the EU intends to invest in renewable energy sources and promote energy efficiency, which can contribute to greater energy independence and improved stability of energy supply in the future. Meanwhile, the war in Ukraine and the COVID-19 pandemic have served as a reminder of the pressing need to ensure the stability and security of the EU's energy supply in the years to come. In order to minimise the risk of energy supply shortages, the EU is taking a number of measures, such as diversifying energy sources, developing energy infrastructure, increasing energy efficiency and improving internal coordination in the energy market. Regardless of these efforts, the cost of energy in the EU is steadily rising, which could ultimately have a negative impact on social and economic development. Such a situation would be contrary to the principles of sustainable development. Furthermore, some states, including Poland, may face particular problems in coping with the EU's energy policy. Some EU countries enjoy favourable environmental conditions in terms of sustainable development policy, e.g. Sweden and Denmark, and may shape their energy system exclusively on the basis of renewable sources. Being a country largely driven by a coal-based economy, Poland still has major challenges to overcome when transforming its energy mix, particularly in the development of renewable energy sources, which needs to be complemented by other technologies, including gas and nuclear power. The opening of the Baltic Pipe pipeline in 2022 can help to replace coal as an energy source, which is crucial for Poland to meet its climate goals in a 5-10 year timeframe. In the longer term, Poland plans to use nuclear energy as a buffer for the energy system, as nuclear power plants are capable of continuous operation. Poland shows great potential for the development of renewable energy, particularly wind and solar energy. Wind and solar energy are dependent on weather conditions and are inconsistent in power generation. In such situations, nuclear power plants can

act as a buffer and supply energy to the grid in the event of a shortage of energy from other sources.

As part of the European Green Deal, the EU focuses on the development of renewable energy sources and energy efficiency. As non-renewable energy sources, nuclear power and natural gas do not fit into this concept.

Against this background, hydrogen appears to be one of the most promising energy carriers that have the potential to play an important role in the energy transition. Hydrogen can be produced from a variety of energy sources, including wind and solar energy, as well as biomass or water through electrolysis processes. Hydrogen can also act as an energy buffer, allowing electricity to be stored during times when there is an excess of energy, such as when there is an overproduction of wind or solar energy, and then used during periods when energy production is lower.

That being said, the introduction of hydrogen into the energy system requires significant investment in production, distribution and storage, as well as the development of technologies, such as fuel cells, that will enable the use of this energy carrier in various sectors, such as transport. Despite these challenges, hydrogen can contribute to developing new technologies, improving energy security and increasing the competitiveness of the EU economy. To this end, in 2020, the European Commission announced a programme called the European Hydrogen Strategy, which intends to promote the production and use of hydrogen as an energy carrier, as well as the development of hydrogen-related technologies (European Commission, 2020).

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STRUCTURE OF ASSETS AND LIABILITIES OF NON-FINANCIAL CORPORATIONS BY SELECTED NACE SECTIONS

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JEL Classification: C10, G3, L20.

Key words: assets, liabilities, non-financial corporations, Median Weber, PROFIT.

Abstract

Experience from nations with established market economies demonstrates that small and medium-sized businesses are more inventive and able to respond to client demands and needs more quickly than giant businesses. Many publications produced by the EU institutions emphasize their crucial function. Small- and medium-sized enterprises (SMEs) reflect a society's entrepreneurial spirit and a sign of healthy competition in every economy. However, these businesses have numerous growth constraints in a setting that is changing quickly. At first, it is not simple. Due to the higher risk that start-ups face compared to larger corporations, they have difficulty obtaining funding from traditional sources and SME enterprises experience an equity gap. As a result, having access to finance has become crucial to expanding and competing in a particular market. In accordance with the accepted legal norms, the receiver is required to comply with the conditions set forth by the capital donor-recipient to be able to access external sources.

One of the most significant influences on a company's ability to fulfil current obligations in full and generate adequate financial results is adherence to the fundamentals of asset financing, which highlight, among other things, the structural relationships in a company's balance sheet. The purpose of the analysis presented in this text is to identify differences in the structure of assets and liabilities between selected NACE sections of non-financial corporations in 2021 year. All analysed assets

and liabilities are characterized by very strong asymmetry. Therefore, the outlier effect has been standardized using Weber median. Further statistical analyses used Kruskal-Wallis non-parametric ANOVA test to determine the similarity between assets and liabilities of selected NACE sections. The analysis showed that there are no significant differences in the assets and liabilities of the different NACE sections.

The PROFIT analysis allowed for a graphical representation of the structure of the similarities between the NACE sections analysed and their arrangement due to the intensity of the assets and liabilities. As regards the NACE sections analysed, three homogeneous groups can be distinguished, of which industry and trade constitute two of them and the others – the third. It has been shown that the industry section is characterized by the highest intensity in both assets and liabilities.

STRUKTURA AKTYWÓW I PASYWÓW PRZEDSIĘBIORSTW NIEFINANSOWYCH WEDŁUG WYBRANYCH SEKCJI PKD

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Kody JEL: C10, G3, L20.

Słowa kluczowe: aktywa, pasywa, przedsiębiorstwa niefinansowe, mediana Webera, PROFIT.

Abstrakt

Doświadczenia krajów o ugruntowanej gospodarce rynkowej pokazują, że małe i średnie przedsiębiorstwa są bardziej pomysłowe i potrafią szybciej reagować na żądania i potrzeby klientów niż przedsiębiorstwa olbrzymie. W wielu publikacjach przygotowanych przez instytucje UE podkreślano ich kluczową funkcję. Małe i średnie przedsiębiorstwa (MŚP) są odzwierciedleniem ducha przedsiębiorczości społeczeństwa i oznaką zdrowej konkurencji w każdej gospodarce. W otoczeniu, które szybko się zmienia, przedsiębiorstwa te napotykają jednak na liczne przeszkody w rozwoju. Na początku nie jest to proste. Ze względu na wyższe ryzyko, na jakie narażone są startupy w porównaniu z większymi korporacjami, mają one trudności z uzyskaniem finansowania z tradycyjnych źródeł, a przedsiębiorstwa z sektora MŚP doświadczają luki kapitałowej. W efekcie posiadanie dostępu do finansowania stało się kluczowe dla ekspansji i konkurowania na danym rynku. Zgodnie z przyjętymi normami prawnymi, aby uzyskać dostęp do źródeł zewnętrznych, biorca jest zobowiązany do spełnienia warunków określonych przez dawcę kapitału – biorcę.

Na zdolność do pełnego wywiązywania się z bieżących zobowiązań z jednoczesnym osiąganiem odpowiednich wyników finansowych wpływa wiele czynników, ale jednym z najważniejszych jest przestrzeganie podstaw finansowania aktywów, które obrazują m.in. zależności strukturalne w bilansie przedsiębiorstwa.

Celem analizy przedstawionej w artykule jest identyfikacja różnic w strukturze aktywów i pasywów między wybranymi sekcjami PKD przedsiębiorstw niefinansowych w 2021 roku. Wszystkie analizowane aktywa i pasywa charakteryzują się bardzo silną asymetrią, dlatego aby znormalizować efekt odstający, użyto mediany Webera. Następnie wykorzystano nieparametryczny test

ANOVA Kruskala-Wallis do określenia podobieństw między aktywami i pasywami wybranych sekcji PKD. Analiza wykazała, że nie ma znaczących różnic w aktywach i pasywach przedsiębiorstw analizowanych sekcji PKD.

Analiza PROFIT pozwoliła na graficzne przedstawienie struktury podobieństw między analizowanymi sekcjami PKD i ich ułożenia ze względu na intensywność aktywów i pasywów. W odniesieniu do analizowanych sekcji PKD można wyróżnić trzy jednorodne grupy, z których przemysł i handel stanowią dwie, a pozostałe – trzecią. Wykazano, że przemysł charakteryzuje się najwyższą intensywnością, zarówno w aktywach, jak i pasywach.

Introduction

Small and medium-sized businesses typically experience growth barriers more keenly than bigger businesses, and the intensity of this sensation varies depending on the local economic climate. During this time, especially the smallest ones, feel them the most strongly (which passes with economic prosperity). The barriers connected to the labor market and qualifications are those that stand out the most during boom times. In contrast, impediments related to business finances and the level of demand are felt most keenly during economic downturns and recessions.

All economic decisions made by business entities are focused at the financial level. Consequently, companies need to analyse the financial criterion alongside other relevant factors such as organisational, legal and human issues. One of the most important management needs is the ability to carry out a rigorous and factually correct assessment of a company's financial situation (Spoz, 2012).

In a market economy, the primary objective of an enterprise is to maximise its value. In order to achieve this goal, the enterprise must operate efficiently and profit, defined as the excess of revenue over costs, is the primary determinant of operating efficiency. Adherence to the principles of asset financing, which emphasise, among other things, the structural relationships on a company's balance sheet, is one of the most critical elements in the ability to meet current obligations in full while achieving adequate financial performance. The purpose of the analysis presented in this text is to identify differences in the structure of assets and liabilities between selected NACE sections of non-financial corporations in 2021 year.

All of the events, activities and conditions that occur inside and outside a company have an impact on its financial success. The financial statements are a composite representation of these factors (Spoz, 2012).

Financial statements are a standardised series of financial statements that explain an organisation and its activities. Accounting records and cost accounting data are used to build them. They are a key source of economic data about the company and serve as the basis for investment decisions. They are issued after the end of the financial year and before the issue of securities and corporate mergers, among other things.

The following characteristics should be present in financial statements: user comprehensibility, clarity of presentation, relevance of the information they provide, reliability and completeness, and verifiability and comparability of the information presented (Walińska, 2009).

Financial statements are a display of data from accounting records that characterise the property, financial and performance status of an enterprise, while providing information on various areas of its economic activity through the use of a typical descriptive formula (Walczak, 2007).

The balance sheet, which shows the company's assets and liabilities at a specific date, the income statement, which summarises the company's activities during a given period assessed through the prism of its financial performance, and the cash flow statement are the most relevant financial statements (showing the amount of cash generated during the reporting period and how it was used). These statements provide an assessment of the financial health of the company (Leszczyński *et al.*, 2004).

Methodical Assumptions

Data on the selected assets and liabilities used in the analyses come from the GUS databases (*Bilansowe wyniki finansowe...*, 2022). The balance sheet also presents a description of the methodology of data collection by the GUS. All analysed diagnostic features are characterized by strong or very strong asymmetry. In order to offset, interfere with the calculation, the effect of outliers, standardization using Weber's median¹ was used. The determined vector, minimizing the sum of Euclidean distances from the given points representing the considered objects, located somewhat in the middle, is also resistant to the occurrence of outliers (Młodak, 2006). The standardization of the data was made according to the following formula:

$$z_{ij} = \frac{x_{ij} - \widetilde{\text{med}}(X_j)}{1.4826 \cdot \widetilde{\text{mad}}(X_j)} \quad (1)$$

where:

$\widetilde{\text{med}}(X_j)$ – Weber median j -th features,

$\widetilde{\text{mad}}(X_j)$ – median absolute deviation of the j th characteristic in which the distance of features to the Weber vector, i.e.

$$\widetilde{\text{mad}}(X_j) = \text{med}_{i=1, \dots, n} |\widetilde{\text{med}}(X_j)|.$$

The data analysis decided on Weber's standardization, because the standardization does not strictly meet the standardization requirements, ie zero

¹ The use of Weber's media-based standardization allows to overcome the distorting effect of outliers, and at every stage of the research treats a set of diagnostic features as a whole.

median and median absolute deviation equal to one, but a better use of mutual – also indirect – dependencies between diagnostic features (Lira *et al.*, 2002; Młodak, 2009).

Selected Assets, Total Equity and Liabilities by NACE Sections in 2021

As in highly developed nations, Poland's economic transformation has facilitated the emergence of a private sector in which small and medium-sized enterprises play a crucial role. They are viewed as dynamic and adaptable entities that rapidly respond to market changes and generate new employment opportunities (Daszkiewicz, 2007),

However, the growth of small and medium-sized businesses is heavily reliant on the scale of their capital, which is typically derived from self-financing and access to external resources. In Poland, financing options from both internal and external sources remain constrained. Companies are unable to manage the collection of receivables due to a chronic shortage of capital (Dominiak *et al.*, 2005).

Traditional and most defining characteristics of small and medium-sized businesses are limited access to sources of operational financing and limited financial resources. Financing can be considered in both a limited and broad sense. In the narrow sense, financing refers to activities that contribute to the acquisition (accumulation) of capital, whereas in the broad sense, financing refers to activities through which capital is not only accumulated, but also invested for a particular period of time, a particular purpose, and in a particular form. Despite its undeniably positive impact on the national economy, the sector is not maximizing its potential. Companies in the sector confront numerous obstacles at the outset and throughout their operations, preventing them from operating efficiently (Dębski, 2005).

The value of a company's capital depends on the value of its sources of financing – equity (shareholder funds) and debt (debt financing) – and their ratio, also known as its capital structure. Leverage is created by the ratio of equity to debt, and an increase in leverage results in an increase in debt in the capital structure. Clearly, debt financing is less expensive than equity financing because financiers assume less risk than shareholders. Is it possible to minimize the cost of capital and maximize the company's value by manipulating the capital structure? To answer this question, it is necessary to comprehend the impact of debt financing on the weighted average cost of capital and the establishment of the firm's market value. The first work to provide a theoretical foundation for the discussion was the theory of two American economists, Merton Miller and Franco Modigliani (MM), who arrived at the paradoxical conclusion that “a firm's

value is independent of its capital structure” – what matters is a company’s profitability and cash flow generation ability. In their first study, the economists presented equity as common shares and debt capital as bonds; the market value of a company is the sum of equity and debt capital. The ratio between equity and debt capital represents leverage. Miller and Modigliani demonstrated that the market value of a firm is independent of its capital structure under the assumption of a perfect market, including the financial equality of firms and private investors (the ability of both parties to borrow at the same interest rate), the equal yield curves of all borrowers, the absence of transaction costs, and the absence of taxes on both firms and individual investors. Miller used the analogy of dividing a cake whose size cannot be altered by using various methods of slicing to explain the model’s outcome (Abeywardhana, 2017).

Cumulative factors within the enterprise itself are among the most frequently cited factors that influence the growth (development) of nonfinancial enterprises. These include the company’s size, age, structure, and location, as well as the structure of its assets and liabilities.

The approach to business location has witnessed a sort of transformation. Today, this variable depends on the industry in which a business operates. Numerous variables influence the decision of where to establish and grow a business. In contrast to the manufacturing industry, a company in the service or sales sector bases its location decision on the scale of both demand and market. Due to the dependence of their business on the availability of basic materials and skilled labor, they can afford to locate their enterprise in a remote area (Duliniec, 2015).

In the balance sheet approach, assets and liabilities make up a group of factors. The assets of a company can be separated into fixed and current assets, while the liabilities can be separated into equity and liabilities. The structure of financing a company’s assets can be divided into equity, debt and other liabilities, as well as both short-term and long-term financing (fixed capital).

Any changes in assets and liabilities between the end and commencement of the period (reporting period) provide information about the enterprise’s financing objects and sources. Any increase in assets, such as the purchase of legal and tangible assets, a fixed asset, an increase in receivables, and a decrease in liabilities, such as the redemption of shares or bonds or the repayment of a bank loan, are the objectives of financing. Sources of finance may include any decrease in assets, such as depreciation (asset depreciation), a decrease in inventories, or the sale of a fixed asset, as well as any increase in liabilities, such as a bank loan, retained earnings, the issuance of shares or bonds, or an increase in operating liabilities. Companies undergoing successive phases of growth have a growing variety of financing structure options from which to choose (Degryse *et al.*, 2012).

Various classifications of barriers and difficulties encountered by the SME sector in the course of its activities can be found in the available literature. There

is a classification that takes into account the timing of barriers during the life of a business: entry barriers, which are associated with the moment of entry (start-up) when the idea is put into action. These include imprecise legislation, corruption, poor economic conditions, low demand, and investment costs that exceed entrepreneurs' financial resources. And the second – exit - development barriers, which are associated with decline or transition to the growth phase.

Another classification scheme is that presented by L.C. Leonidou, who classified growth barriers according to those associated with the internationalisation (equivalent to exporting) process. He identified four categories of obstacles:

- internal – domestic (internal – domestic), which stem from within the company, such as a poor perception of the risks associated with exporting products;
- internal – foreign, which are related to the small company's limited marketing capabilities, product delivery issues, and excessive transport costs;
- external – domestic, which are beyond the company's control, such as the intricacy of international marketing documentation;
- external – foreign, resulting from external departments and affecting international markets, such as tariff restrictions and exchange rates.

Due to the paper's topic, it seems more appropriate to classify the internationalisation barriers proposed by K. Miesenbock, who divides them as follows (Daszkiewicz, 2004):

- export barriers, such as export documents, customs formalities, the poor economic and political situation on foreign markets, or a lack of international demand for the company's manufactured goods;
- resource limitations, such as personnel, financial, informational, and production capacity restrictions;
- marketing barriers – difficulties resulting from product adaptation, after-sales service guarantee, commercial intermediaries, communication, and sales logistics;
- obstacles related to the owner's or manager's attitude, including a lack of experience, knowledge, contacts, and interest in exporting the product.

On the other hand, according to D.J. Storey, we should differentiate between the management barrier, which results from insufficient management skills of the owner and excessive use of intuition; the demand barrier, which is characteristic of a market economy and weakens during good times and intensifies during a recession; and the financial barrier, which increases as the company grows due to a greater need for capital (Adamczyk *et al.*, 2004).

In addition to market and financial barriers, W. Pitkowski lists administrative and legal barriers, barriers resulting from the fiscal system (Poland's complex tax system), barriers related to the state (frequent changes in regulations, lengthy waiting times for decisions, administrative procedures), and barriers related to telecommunications (Michalski *et al.*, 2008).

Based on its own research and that of the Ministry of Economy and the Central Statistical Office, the Polish Agency for Enterprise Development distinguishes

the following barriers: market and social barriers, capital barriers, barriers resulting from economic policy, legal barriers, infrastructural barriers, and information barriers, which, despite the state's constant efforts to eliminate them, still effectively impede the development of an e-commerce sector (Mazur, 2007).

The first ones have to do with the market environment of the SME sector, such as regional variations in demand, increasing market competition, etc. The primary challenges small businesses face is a decline in the number of orders, the inability to locate new markets, a decline in local/regional demand, and the effects of foreign direct investment. Due to insufficient financial resources, small and medium-sized businesses are frequently disadvantaged when competing with large corporations. The social barrier, on the other hand, stems from the low mobility of workers on the labor market and the general reluctance of those with advanced degrees to work in small businesses (Bławat, 2004).

Another group of obstacles that small and medium-sized businesses confront is a lack of financial resources to launch or maintain operations. The level of accumulated private assets and private resources at the entrepreneur's disposal is typically insufficient to operate on a larger scale than previously, and the conservative policy pursued by banks is a fundamental impediment to raising capital. In addition, companies in the SME sector are generally viewed as hazardous, resulting in significantly less favorable credit conditions. This is predominantly reflected in high interest rates and stringent potential collateral requirements. The unfavorable treatment of SMEs by banks can be attributed to a number of factors, including the lack of assets required to secure loans/credits, the inability of owners and managers to develop a business plan or credit application correctly, and the inability to document the company's relatively long history. In addition to limiting the growth of small and medium-sized businesses, banking policy contributes to the absence of opportunities to implement technological innovations. This group of obstacles also includes difficulties in obtaining public contracts, with the procurement process being the primary obstacle in this instance. As part of the bidding process, tiny and medium-sized businesses are required to pay a deposit. Frequently, the required amount is so excessive that businesses are simply unable to raise it. Even if they win the bid, entrepreneurs are required to pay an unaffordable deposit. Additionally, payment terms are problematic for the industry. SMEs must conform to the terms stipulated by DPs, which include extended payment terms. After a lengthy wait, the redemption of the cash circulation procedure can result in a loss of liquidity. By virtue of SMEs not going to court, larger companies feel unpunished, while SMEs fear losing an essential customer (Waniak-Michalak, 2007).

Additionally, unfavorable economic policies hinder the development and operation of businesses. This is especially true for the labor market and social security. As a result of the obligation to pay additional benefits, employees cost the company more than their total salary, and the costs of creating new positions

are extremely high. The rather complex regulations of Polish law and the level of taxes are also significant impediments to the operations of small and medium-sized businesses. Instability and ambiguity of legal regulations, manifested in constant changes to regulations, making it difficult to predict/plan the future and increasing the costs of business through the involvement of advisors and specialists, burdensome administrative procedures and administrative limitations related to undertaking a given business activity, which interfere with the generally accepted in the European Union freedom of undertaking business, are the most frequently cited obstacles.

Access to infrastructure is difficult for businesses for several reasons, including its complexity, poor quality, and expense. The infrastructural barrier, as it is known, pertains to transportation, communications, energy, and telecommunications. The quality of Polish highways is severely lacking. They require improvement, the construction of new sewage treatment facilities, and the disposal of waste (Ostrowska, 2014).

Information barriers result from the lack of involvement of local, regional, and central authorities in organizing information campaigns that would bring closer the issues pertaining to the use of aid programmers, public procurement, and macroeconomic indicators (Dominiak *et al.*, 2005):

- related to the low availability of advisory, legal, technical, etc. services, i.e. information available at the local level;
- related to the low level of technical infrastructure and local barriers, e.g. related to insufficient space of occupied premises or rather high maintenance costs;
- related to employment barriers, such as those resulting from structural mismatches between the labour market and the education system.

The classification of factors influencing the capital structure of economic entities demonstrated their diversity and multiplicity. Numerous factors are interconnected, which makes the problem complex, and the analysis of variables that may influence the level of a company's debt presents a few challenges. Nonetheless, understanding this issue enables business managers to make more informed judgments regarding the selection of financing sources. Therefore, it is justifiable to conduct empirical research into the factors that influence the selection of a particular capital structure (Michalski, 2009).

The balance sheet is a record that statistically represents in value terms the state of economic resources (assets) and their sources of financing (origin), considering the financial result (profit or loss), or liabilities, at a given point in time. The balance sheet gives a picture of a company's assets and the finances that sustain them by listing these assets and indicating the parties that have a legal claim to them.

The assets of a company on the balance sheet are all the resources it owns, uses and can monetize (or earn from) (Dynus *et al.*, 2005). A company's assets are the resources it has access to and uses to conduct its business, including

physical property, intellectual property, money, and other financial instruments. For balance sheet purposes, assets are summarized according to a liquidity criterion that is based on their economic and financial content. Equity, reserves, liabilities, accumulated expenses and accrued income form the liabilities side, while fixed assets, current assets and accrued expenses form the assets side. All a company's assets and debts are arranged in a specific order on its balance sheet. Assets in manufacturing companies are ranked according to their liquidity, while liabilities are ranked according to their maturity (Gabrusewicz, 2014).

The balance sheet is considered the most important element of the financial statements as it provides the most comprehensive information for assessing the asset and financial condition of any business entity. Both external stakeholders such as investors and management benefit from the results of financial analysis, which is based on the information contained in the balance sheet (Michalski, 2004). Based on the data presented in Table 1, basic statistics for the selected assets and liabilities adopted for the analysis have been determined (Tab. 2).

Table 1

Selected assets, total equity and liabilities by NACE sections

Specification	Fixed assets	Current assets	Stocks	Equity	Liabilities and provisions	Long-term liabilities	Current liabilities	Liabilities from deliveries and services
	in billions PLN							
Industry	1,131.8	841.3	263.7	982.6	991.2	238.5	584.0	262.3
Construction	46.3	120.8	31.8	69.2	98.1	14.2	64.3	29.4
Trade; repair of motor vehicles	222.7	422.9	171.1	269.2	376.9	59.0	285.0	181.7
Transportation and storage	216.0	84.9	4.5	97.0	203.9	60.7	53.7	25.3
Accommodation and catering	26.4	6.7	0.5	16.6	16.5	9.5	5.5	1.9
Information and communication	139.0	70.8	5.0	113.1	97.1	44.7	37.8	16.9
Real estate activities	127.8	36.0	8.7	105.3	59.6	29.8	19.9	5.2
Professional, scientific and technical activities	107.7	113.3	3.4	90.5	130.8	84.2	35.2	12.2
Administrative and support service activities	71.3	36.9	1.8	25.4	82.8	37.6	39.6	6.8
Other service activities	2.9	1.7	0.2	1.9	2.7	1.2	1.3	0.8

Source: *Bilansowe wyniki finansowe...* (2022).

Table 2

Selected assets, total equity and liabilities by NACE sections – Basic statistics

Specification	Fixed assets	Current assets	Stocks	Equity	Liabilities and provisions	Long-term liabilities	Current liabilities	Liabilities from deliveries and services
Arithmetic average	209.2	173.5	49.1	177.1	206.0	57.9	112.6	54.3
Median	117.8	77.9	4.8	93.8	97.6	41.2	38.7	14.6
Weber's median	112.4	78.1	11.6	88	102.9	42.8	42.4	17.7
Standard deviation	315.4	250.6	87.1	277.8	280.8	64.9	175.2	86.3
Median standard deviation	76.05	42.4	10.45	43.85	64.85	23.25	22.2	12.1
Skewness	2.9	2.2	2.0	2.8	2.5	2.4	2.3	1.9

Source: author's own elaboration using Statistica 13.3.

After analyzing the variable distributions, it turned out that there was a lack of normal distribution for each assets and liabilities, and the lack of homogeneity of variance, which precludes the use of ANOVA one-way analysis. Therefore, Kruskal-Wallis non-parametric ANOVA test (nonparametric equivalent of one-way analysis of variance) was carried out, which will allow to determine whether there are significant differences between assets.

At the beginning of the data analysis, the following hypotheses were put forward:

H_0 : There are no significant differences in the assets and liabilities of the different NACE sections.

H_1 : There are significant differences in the assets and liabilities of the different NACE sections.

The results of Kruskal-Wallis's ANOVA test are presented in Table 3.

On the basis of $p > 0.05$ there are no grounds for rejecting the H_0 hypothesis and so it can be concluded that there are no significant differences in the assets and liabilities by NACE sections.

According to statistical data, the holdings of assets and liabilities by individual NACE sections divisions of non-financial firms in Poland varied slightly. Similar amounts of assets and liabilities are often held in larger parts of the NACE sections, such as industry, trade, or construction. Admittedly, a comprehensive sectoral analysis may reveal some discrepancies, but the general trend indicates that the amounts of assets and liabilities in individual sections of the NACE are comparable (Walińska, 2009).

Table 3

Kruskal-Wallis test results ANOVA

Dependent: bilions PLN	Kruskal-Wallis ANOVA		
	Dependent variable (Grouping): ACTIVE		
	Kruskal-Wallis test: $H(7, N = 80) = .1922222, p = 1.00$		
	code	the sum of ranks	average rank
Fixed assets	1	420	42
Current assets	2	401	40
Stocks	3	396	39
Equity	4	396	39
Liabilities and provisions	5	425	42
Long-term liabilities	6	390	39
Current liabilities	7	404	40.4
Liabilities from deliveries and services	8	408	40.8

Source: author’s own elaboration using Statistica 13.3.

Non-financial companies in the Polish economy are diversified in terms of the NACE sections in which they operate. There is a division into industry, trade, construction, and transport. Having adequate assets and liabilities is critical to the functioning of these companies. It may seem strange that, despite such a wide range of activities, the amount of assets and liabilities held by the different parts of the NACE sections shows no noticeable differences (Leszczyński *et al.*, 2004).

Analysing data from public sources, it can be concluded that, in general, assets and liabilities in the NACE sections divisions in Poland are stable. For example, in the case of the industrial area, where many different manufacturing enterprises operate, the size of assets and liabilities is at a comparable level. In the trade area, where numerous trading and wholesale companies operate, there are no visible differences in the level of assets and liabilities. The situation is similar in the construction and transport area (Walczak, 2007).

However, it should be noted that a broad sectoral analysis may reveal some differences in the asset and liability holdings of individual companies. In the fast-growing construction sector, several corporations own huge amounts of real estate, such as building plots or finished buildings. Vehicles, on the other hand, account for a significant proportion of assets in the transport industry.

Notwithstanding these minor differences, the general trend indicates that asset and liability levels are comparable in the different parts of the NACE sections. It is worth mentioning that this situation may be since most companies operate in a consistent manner, without significant deviations from industry norms. Enterprises employ the same number of people, have the same infrastructure, and use comparable sources of financing (Gad, 2015).

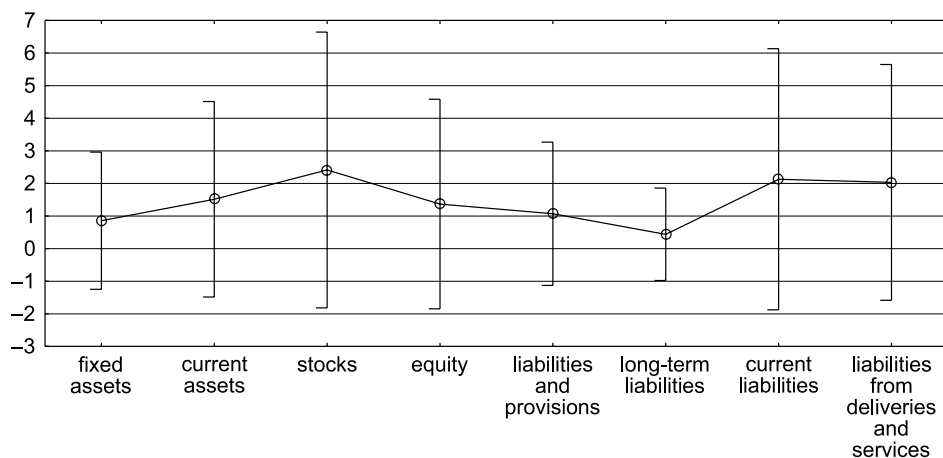


Fig. 1. Expected marginal averages of NACE sections' assets and liabilities
Source: author's own elaboration using Statistica 13.3.

The selection of contrast groups was made on the basis of Figure 2. The focus was therefore on the contrasts between the group: construction (x_B), transportation and storage (x_D), accommodation and catering (x_E), information and communication (x_F), real estate activities (x_G), professional, scientific and technical activities (x_H), administrative and support service activities (x_I), other service activities (x_J) and industry (x_A) and trade (x_C). The following hypotheses were tested for this purpose:

$$A: H_0: K = -4x_A + x_B - 4x_C + x_D + x_E + x_F + x_G + x_H + x_I + x_J = 0$$

$$B: H_0: K = -x_A + x_C = 0$$

The determined contrast ratios are shown in Table 4. On the basis of $p < 0.05$ for both contrasts A and B hypothesis have to be rejected.

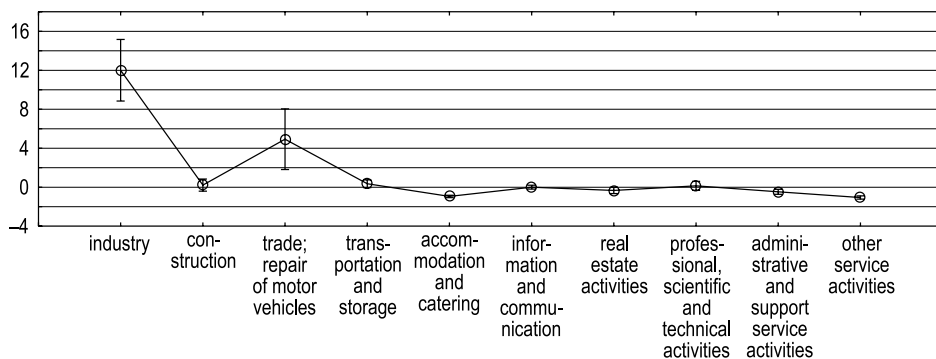


Fig. 2. Expected marginal averages of NACE sections
Source: author's own elaboration using Statistica 13.3.

Table 4

Coefficients of contrast and evaluation for the comparisons between group

No. of subclass	Contrast coefficients for intergroup comparisons	
	assets, total equity and liabilities	contrast ratios for the subclass
1	industry	-4
2	construction	1
3	trade; repair of motor vehicles	-4
4	transportation and storage	1
5	accommodation and catering	1
6	information and communication	1
7	real estate activities	1
8	professional, scientific and technical activities	1
9	administrative and support service activities	1
10	other service activities	1
One-dimensional significance tests for comparisons		
	effect	error
Sum of squares	975.11	206.69
Degrees of freedom	1	70
Average squares	975.11	2.95
<i>F</i>	330.24	
<i>P</i>	0.00	
No. of subclass	contrast coefficients <i>B</i> for intergroup comparisons	
	assets, total equity and liabilities	contrast ratios for the subclass
1	industry	-1
2	construction	0
3	trade; repair of motor vehicles	1
4	transportation and storage	0
5	accommodation and catering	0
6	information and communication	0
7	real estate activities	0
8	professional, scientific and technical activities	0
9	administrative and support service activities	0
10	other service activities	0
One-dimensional significance tests for comparisons		
	effect	error
Sum of squares	200.22	206.69
Degrees of freedom	1	70
Average squares	200.22	2.95
<i>F</i>	67.81	
<i>P</i>	0.00	

Source: author's own elaboration using Statistica 13.3.

The contrast *A* between group come with group of construction, transportation and storage, accommodation and catering, information and communication, real estate activities, professional, scientific and technical activities, administrative and support service activities, other service activities and group of industry and trade went significantly different from zero. That is, the average of the first group (construction, transportation and storage, accommodation and catering, information and communication, real estate activities, professional, scientific and technical activities, administrative and support service activities, other service activities) is significantly different from the mean of second group (industry and trade). Similarly, contrast *B* is interpreted (Tab. 4). That is we can consider three homogeneous groups.

PROFIT analysis is a procedure that combines two analytical techniques: multivariate scaling and multiple regressions. The purpose of multivariate scaling is a graphic presentation of structure of similarity between NACE sections with regard to the analysed assets and liabilities (Fig. 3). It is assumed that the shorter the distance between sections, the more they are similar to each other due to the analysed assets, total equity and liabilities. The graph shows that the section trade and section industry are clearly out of step with the rest of NACE sections just like analized contrasts above.

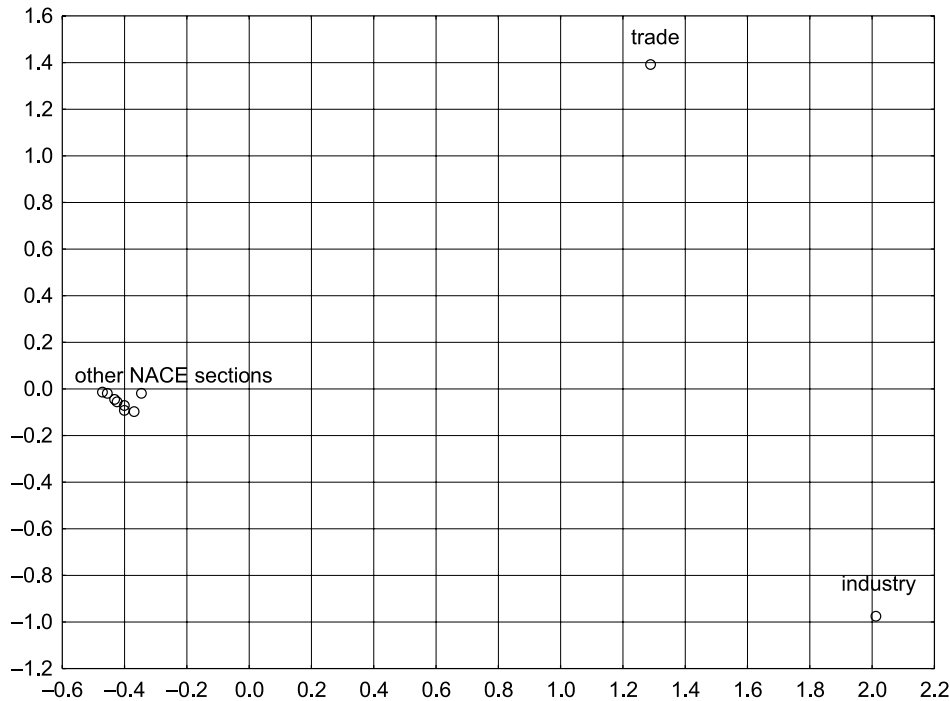


Fig. 3. Map of perception of NACE sections

Source: author's own elaboration using Statistica 13.3.

Probably the main reason for this is attest to the fact that due to the nature of their activities, companies in areas such as industry, manufacturing, trade and repair have a high value of current assets, particularly inventories. In contrast, companies in areas such as health care, service activities, hotels and restaurants reduce the value of current assets to the minimum necessary. The structure of a company’s assets is determined by the industry. In contrast to manufacturing organizations, which make greater use of assets in the production process, service companies often have lower asset values.

Then each NACE section was assigned the values of its coordinates on the map. The PROFIT analysis algorithm will use information about coordinates (independent variables) and values of objects in relation to each of the assets, total equity and liabilities, performing multiple regression analysis. Eight regression analyses were performed. Standardized regression equation coefficients determine the direction and the sense of the vector of each assets, total equity and liabilities. To make the graphs clearer, assets and liabilities were shown in two separate figures (Figs. 4, 5).

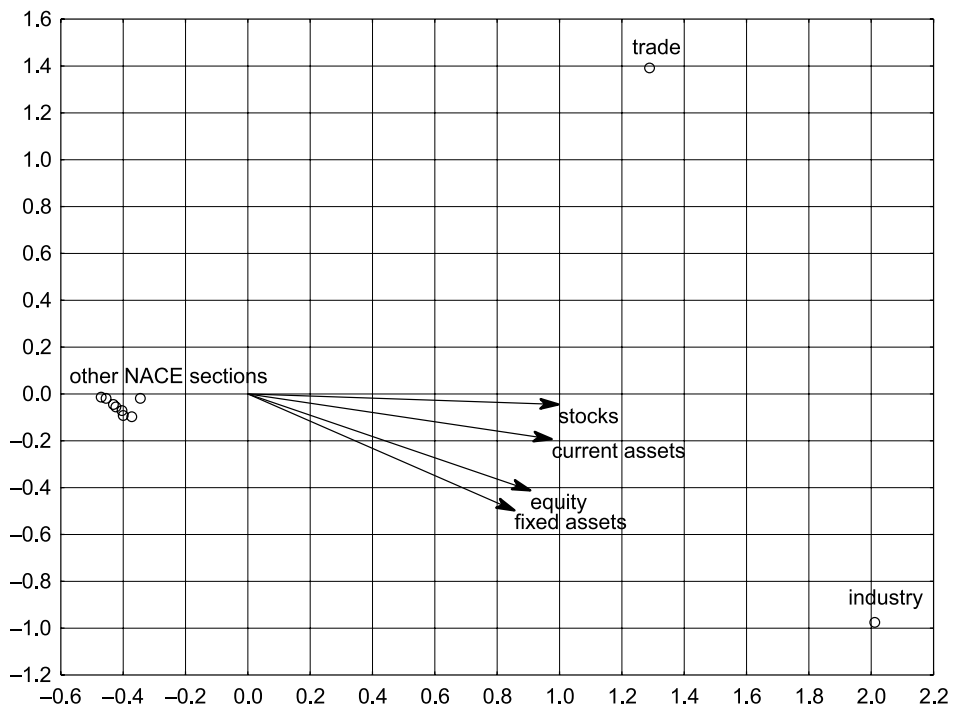


Fig. 4. Map of perception of all assets

Source: author’s own elaboration using Statistica 13.3.

If we put all the vectors of each analysed NACE section on the perception map (Fig. 4), we see that, the section industry located in the fourth quadrant of the coordinate system is characterized by the highest intensity of all types of assets and all NACE sections located in third quadrant of the coordinate system are characterized by the lowest intensity of all types of assets. The section trade located in first quadrant of coordinate system ranks second in terms of intensity of all asset types. Similarly the situation is when it comes to liabilities (Fig. 5).

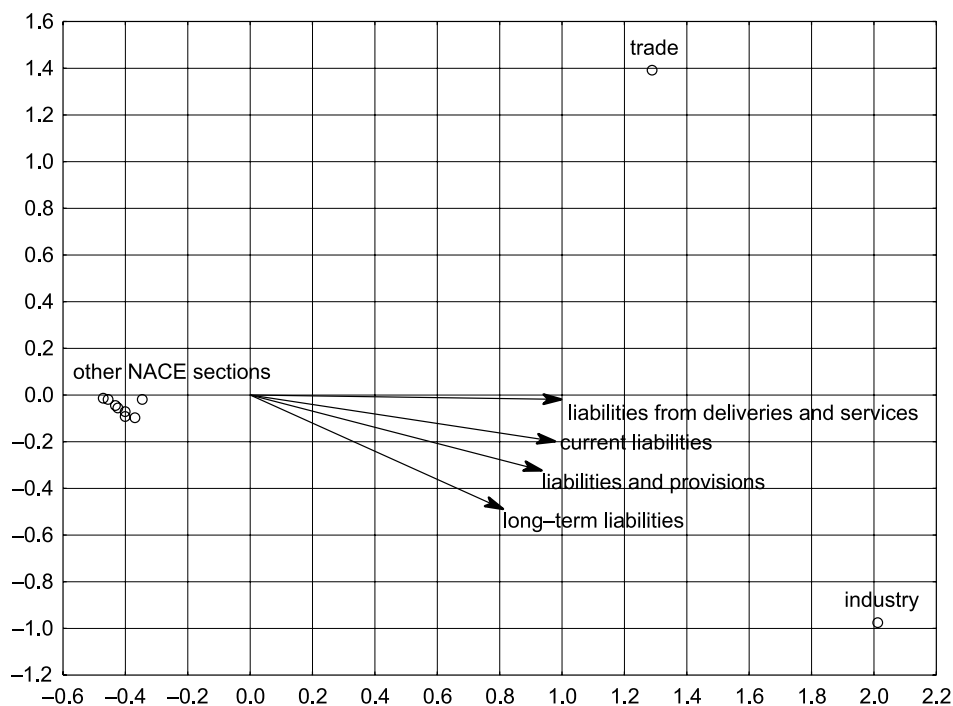


Fig. 5. Map of perception of all liabilities

Source: author's own elaboration using Statistica 13.3.

They made it possible to determine how NACE sections were located due the intensity of given assets and liabilities. It should be said that for the interpretation of results the information about distance the objects (NACE sections) from a straight line containing the vector is not important. The point is how located are orthogonal projections of the objects on this straight line. The ordering of these orthogonal projections is interpreted.

On the map (Fig. 6), we can see that due to Fixed assets, industry has the highest value and other service activities – the lowest.

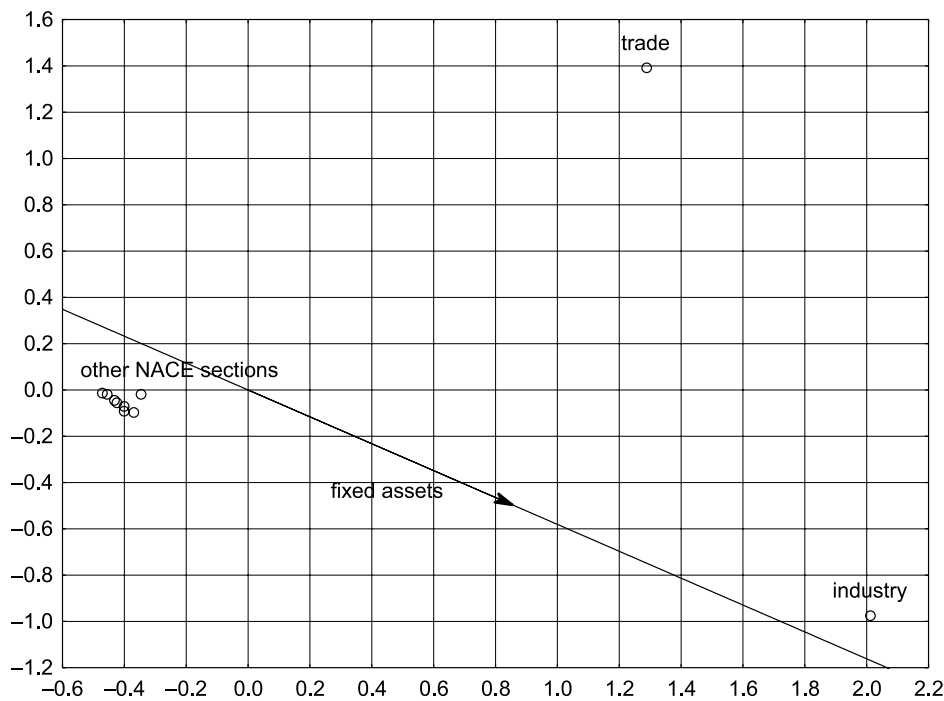


Fig. 6. Map of perception of the selected asset (fixed assets)

Source: author's own elaboration using Statistica 13.3.

Conclusions

Economic and financial analysis, which is carried out in part by using the information contained in financial statements, serves as a platform for making judgements about the performance of companies. These judgements can be positive or negative. Because it reveals the monetary value of a company's assets and financing as at the last day of the reporting period, the balance sheet is an important element of the financial statements (Gad, 2015).

The nature of the company is the primary determinant of the asset structure. According to the perception map, the most valuable sector in terms of fixed assets, also known as property, plant and equipment, is the manufacturing sector, while the least valuable sector is the service activities. This is because the manufacturing sector tends to require a large investment in machinery, equipment, and real estate, resulting in a high value of fixed assets. This is because the industrial sector usually requires this type of investment (Blach, 2009).

On the other hand, the value of fixed assets in the service sector is often characterized by a lower average cost, and the service industry usually requires

less investment. Investment in people, both in terms of their knowledge and skills, is prioritized in the service sector, which ultimately translates into improvements in the quality of services offered by enterprises.

In addition, on the basis of the analyses carried out, it was shown that:

- there are no significant differences between the assets and liabilities of corporations of all analyzed NACE sections;
- due to assets and liabilities, there are some similarities and differences between the corporations of the NACE section. Three homogeneous groups were distinguished: industrial, trade and other sections;
- the highest intensity of both assets and liabilities is shown by the corporations of the Industry section. The corporations of the Trade section were classified second, and other sections as the third.

In Poland, according to the NACE, the manufacturing sector still plays an important role in the economy, while the service sector has seen significant progress and dynamic development. However, the value of fixed assets in the manufacturing sector tends to be higher than in the service sector. This difference in value can affect how customers and investors view the manufacturing and service sectors. When a company pursues an asset financing strategy that is inadequate in relation to its market risk, the structure of the balance sheet has a significant impact on the company's profitability as well as its liquidity. This is because the structure of the balance sheet is reflected in the valuation of assets.

Small and medium-sized enterprises (SMEs) do not operate on a large scale, and the possibilities of financing an investment project frequently depend on the size of the enterprise, so it is possible to conclude that the diversity of financing sources available on the market is merely theoretical. The lack of experience, which is contingent on a brief period of operation, or the aforementioned local diversity of activities causes institutions that provide capital to entrepreneurs to dampen their enthusiasm. Without adequate capital expenditures, it is impossible to remain on the market, and as we all know, companies operate in a dynamic environment where ideas and innovative activities introduced by competitors force business owners to constantly evolve. Therefore, having adequate resources becomes a necessity for a business.

It should be noted that the significance of small and medium-sized enterprises (SMEs) to the economic development of a nation is not solely determined by economic potential. Small and medium-sized businesses have a highly dynamic perspective on the environment. They are the quickest on the market to adapt to the ever-changing needs and preferences of customers, and their production is based on seeking market opportunities and niches in which they can operate actively without fear of competition from large corporations; they only subcontract with DPs. Typically, businesses in the sector have a comprehension of the local market and potential competition. Therefore, their function in stimulating the economic growth of the nation, region, or in eliminating unemployment is indispensable.

The elimination of both internal and external obstacles can enhance the utilization of diverse sources of financial support. To establish a favorable environment for the development of SMEs in Poland and to enable an increase in the competitiveness of the entire enterprise sector, time and effort are required.

Translated by Authors

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OPINION OF RESIDENTS ON LIGHTING IN THE CITY OF PILA

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Abstract

The article analyzes the efficiency of street lighting in the city of Pila. For this purpose, a survey was conducted to find out the opinions of residents about lighting in the city of Pila. For this purpose, 167 residents of Pila were asked what they thought about lighting in the analyzed city. Based on the survey, some of the respondents believe that road lighting is good and effective, while the other part says that lighting does not fulfill its functions, tasks and something should be changed in this regard. There are several streets that are well and poorly lit at the same time, so the effectiveness of street lighting in these places cannot be clearly determined. There is also a group of respondents who indicate that the lighting does not work properly, i.e. it is out of order for a long time. The last part of the article contains suggestions for upgrading city lighting in Pila. The article ends with a summary.

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Kody JEL: R4.

Słowa kluczowe: transport, oświetlenie miejskie, Piła.

A b s t r a k t

W artykule przeanalizowano efektywność oświetlenia ulicznego w Pile. W tym celu przeprowadzono badanie ankietowe, aby poznać opinie mieszkańców na temat oświetlenia w mieście. Zapytano 167 mieszkańców Piły, co sądzą na temat oświetlenia w analizowanym mieście. Część respondentów uważa, że oświetlenie drogowe jest dobre i skuteczne, natomiast druga część twierdzi, że oświetlenie nie spełnia swoich funkcji, zadań i należałoby coś w tej kwestii zmienić. Jest kilka ulic, które są jednocześnie dobrze i słabo oświetlone, dlatego nie można jednoznacznie określić skuteczności oświetlenia ulicznego w tych miejscach. Jest też grupa respondentów, którzy zwracają uwagę na to, że oświetlenie nie działa prawidłowo, tzn. jest nieczynne przez dłuższy czas. W końcowej części artykułu zaproponowano propozycje modernizacji oświetlenia w Pile. Artykuł kończy się stosownymi wnioskami.

Introduction

Every citizen of the Republic of Poland should be provided with convenient conditions when navigating in the evening and at night on public roads or pavements. Road lighting reduces the number of accidents and increases the comfort of all road users. Test results conducted to analyze the effectiveness of road lighting have shown that the number of accidents at night is reduced by 30-45% with proper road lighting (*Standards concerning...*, 2018).

Road Lighting

In the literature, the issue of lighting has existed for a long time and has been widely discussed. Lighting accompanies people in all their daily activities. Lighting is used, among others, in apartments, schools, offices, social spaces, sports facilities, as well as on roads and through the middle of transport. Light

is a very important factor in traffic safety. It is important to provide the best possible comfort for all road users: pedestrians, cyclists and those using motor vehicles.

Lighting is the use of light, which aims to make places, objects and the environment visible. The most important task of road lighting is to develop such an environment so that the person who is there can feel safe (*Charakterystyka oświetlenia elektrycznego...*, 2018).

The main task of road lighting is primarily to ensure safety and comfortable movement of road users especially in zones with increased risk of accidents. Focus should be on the places where motor traffic streams intersect with pedestrian traffic (Górczewska, 2016).

One of the basic slogans that refers to road lighting is the slogan 'see and be seen. This applies to both drivers and other road users. Night time, along with unlit pavements and roads, is associated with many people by great danger. This affects the belief of many people that a bandit may be lurking around the corner. The provision of artificial lighting is becoming a very important factor that will allow the use of street space at night. It guarantees well-being, health and makes the space useful (Martyniuk-Pęczek, 2014).

There are many places in the world where many people stay there even after dark. A lot of things are influenced by the fact that they are intensively used. Among them we can mention lighting. Artificial light is a very important element in forming the image of space. It mainly complements the basic function of the place. The city's lighting urban planning has a very important function, as lighting projects are one common, main element of the city's functioning when it gets dark. We can say that lighting is presented as a creator of space, because it creates the night life of the city.

There are many groups of light source parameters, but photometric features are the most important for road lighting. The group of photometric parameters of the light source can include: luminous flux, luminous efficiency, durability, luminance, luminance. Information on this subject can be found in the following literature (Kolakowski, 2003; Tabaka, 2012; Owczarek, 2014; *Luminancja*, 2018; *Parametry źródeł światła*, 2018; Oziemblewski, 2023a, 2023b).

Lighting fittings are the most important element of any road infrastructure. Due to the nature and place of installation, they are exposed to a large number of harmful factors. These include, but are not limited to: atmospheric, temperature differences, water and dust penetration. That is why it is so important for the luminaire to be correctly designed.

The definition of a lighting fixture states that it is a device designed to distribute, filter and transform the luminous flux of one or more light sources (Wandachowicz, 2007). The luminaire is an electrical device that is used by a larger number of recipients. It is important to keep the lighting fixture safe and construct optimal performance parameters.

Analysis of the City of Piła

The city of Piła is a picturesque agglomeration located on the River Gwda, on the edge of West Pomerania and Greater Poland. Half of the city's surface are parks and forests, filling the areas between new residential districts. Nearby lakes add beauty to this city. The city area is a space of unspoiled nature and wonderful landscapes that encourage active recreation. The city, thanks to its good location, is a significant intersection of transport paths in the country. Piła is also an uninterrupted and intensively developing economic center. The leading branches of the economy include the electronics, electrical and printing industries. Piła is a town with about 74,000 inhabitants (*Nasze miasto*, 2023).

Road infrastructure of the city of Piła

There are four categories of public roads in Piła: national roads, provincial roads, pociat roads and communal roads:

- national roads No. 11 and 10, provide trans-regional transit connections Koszalin-Poznań-Bytom and Szczecin-Warsaw;
- provincial roads No. 180, No. 179 and No. 188 in the city of Piła along streets: ul. Siemiradzkiego, al. Wojska Polskiego, al. John Paul II, al. Powstańców Wlkp.;
- powiat roads in the city of Piła: Browarna, Staromiejska, Ceglana, Kamienna, Kossaka, Kotuńska Droga, Kwiatowa, Lelewela, Lotnicza, Ludowa, 11th November, Łączna, Okrzei, Okólna, 1st Maja, Medyczna, Mickiewicza, Podchorążych, Roosevelt, Rydygier, Śniadeckich, Towarowa, Tucholska, Młodych, Walecka, Wawelska, Spring of Nations, Wyspiański, Zygmunt Stary, Road to Zelgniewo;
- 321 communal public roads and internal roads.

Below are the categories of roads in the city of Piła. According to the data, the lengths of these sections are as follows (*Stan i rozwój infrastruktury drogowej w Pile*, 2023):

- national roads: 13.5 km;
- voivodship roads: 11.6 km;
- powiat roads: 42.1 km;
- commune roads: 139.59 km.

One of the most important aspects in the road infrastructure of the city of Piła is the beltway, i.e. the national road number 10 and 11. The modern beltway makes it possible to bypass the city center, thanks to which the traffic in the city has become smooth.

Structure of road lighting in the city of Piła

In the city of Piła over the years, investments related to the reconstruction and construction of lighting were carried out. The last such investment was in 2017, as part of which 253 new lighting poles appeared in the city. These are innovative poles with energy-saving LED lighting. The investment was implemented as part of a project called “Supporting a low-carbon economy by improving urban mobility in Piła”. The lighting used in the above streets is modern and energy-saving based on LED light sources. Ultimately, the installation of central control of its intensity is planned, especially at night when there is little traffic on the roads.

The city of Piła also cares about the current lighting, which is in constant use. The part, which is owned by the city of Piła, is maintained by a company selected on the basis of a tender. This is a tender for the provision of maintenance services for street lighting devices, roads, squares and bridges in the commune of Piła. ENEA S.A. is responsible for the maintenance of the second part of lighting in the Piła commune. and ENEA Operator private limited company.

Lighting that is located in Piła is 94% owned by ENEA joint-stock company and ENEA Operator private Limited company (ENEA) only 6% of the lighting belongs to the Piła Commune. The following is the ownership list of street lighting (*Informacja o wyniku kontroli doraźnej...*, 2015):

- number of lighting points – 6,623 pieces, including:
 - ownership of ENEA – 5,387 pieces,
 - ownership of the commune – 1,236 pieces (18.66%);
- the number of poles used for luminaire assembly – 6,426 pieces, including:
 - ownership of ENEA – 4,680 pieces,
 - ownership of the commune – 873 units (13.59%);
- length of cable lighting lines – 181.79 kilometers, including:
 - ownership of ENEA – 144.85 kilometers,
 - ownership of the commune – 36.94 kilometers (20.32%);
- the length of overhead lighting lines – 19.15 kilometers, including:
 - ownership of ENEA – 18.79 kilometers,
 - ownership of the commune – 0.36 kilometers (1.88%);
- number of lighting circuits – 412 pieces, including:
 - ownership of ENEA – 327 pieces,
 - ownership of the commune – 85 pieces;
- number of working earths – 754 pieces, including:
 - ownership of ENEA – 275 pieces,
 - ownership of the commune – 479 pieces;
- number of lighting cabinets (power distribution boards) – 162 pieces, including:
 - ownership of ENEA – 116 pieces,
 - ownership of the commune – 46 items (28.40%);

- number of energy measuring points – 162 pieces, including:
 - ownership of ENEA – 116 pieces,
 - ownership of the commune – 46 items.

Methodology

The purpose of the survey was to find out whether, in the opinion of city residents, road lighting in the city of Pila is effective, or whether something should be changed. The survey was based on a questionnaire. Due to the prevailing COVID-19 pandemic, the survey was conducted online.

The subject of the survey was to find out the opinions of Pila residents on lighting: traffic roads, pedestrian crossings, bus stops, bicycle paths, public buildings, pedestrian crossings and residential areas. People from all districts of Pila participated in the survey, namely: Gladyszewo, Górne, Jadwizyn, Motylewo, Podlas, Staszyce, Srodmiescie, Zamosc and Zielona Dolina.

Results and Analysis of Test Results

The research method used in the article gave the opportunity to formulate conclusions in which the findings were adopted. An important part of the research procedure is certainly the analysis of research results and confrontation with specific research problems. The study was conducted using a questionnaire. The research analyzed the questionnaires that were filled in electronically by the inhabitants of the city of Pila, then the conclusions were constructed. We used our own questionnaire, which consisted of 16 questions, including 3 questions constituted a metric. The study was completely anonymous. Performing the above study, an analysis of the results is presented in Figure 1.

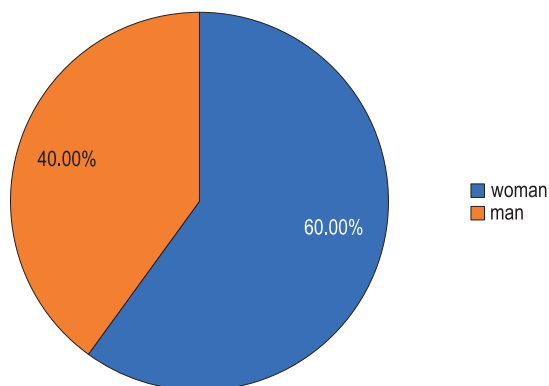


Fig. 1. Sex structure

Source: own elaboration.

167 residents of the city of Piła participated in the study. Incorrectly completed surveys were not considered. Based on the conducted research, it was found that women dominated in the group of respondents, constituting 60%, while men constituted 40%. The results are presented in the Figure 1.

Figure 2 presents the age of the respondents. Considering the data in the chart above, it can be seen that the overwhelming number of respondents are in the 18-25 age range. According to research, it is 51.5%. In second place are people in the age group 26-35 years – 22.4%. Third place was occupied by people from 36-45 years old – 14.5%. The next item is respondents from the age group 46-55 years – 8.5%. In the age group 56-65 years, 2.4% responded. However, the last position is occupied by people over 66 years old – 0.7%.

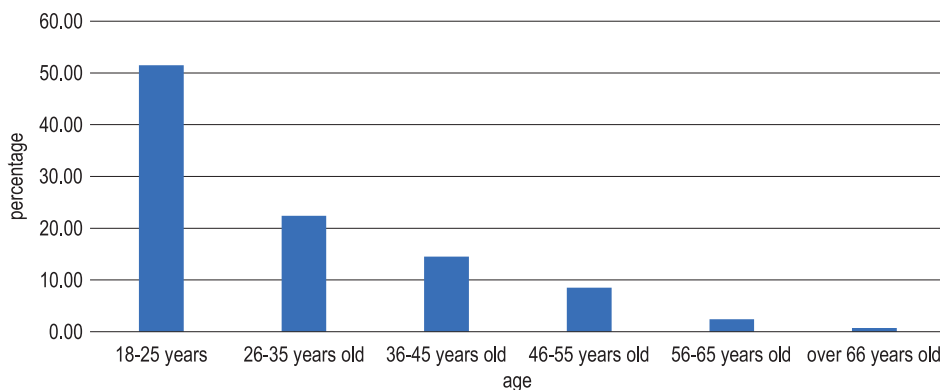


Fig. 2. Age of the respondents

Source: own elaboration.

Another issue in the questionnaire was the question about the residential district in the city of Piła (Fig. 3). The order and percentage number of districts inhabited by respondents are presented below: Zamoście – 26.1%, Śródmieście – 20.1%, Górne – 13.9%, Podlasie – 10.9%, Zielona Dolina – 10.9%, Staszyce – 7, 9%, Motylewo – 4.2%, Jadwiżyn – 3.6% and Gładyszew – 2.4%. The largest number of respondents live in Zamoście. This may be due to the fact that this is an area where there is a problem with road lighting efficiency, and many residents wanted to have their say.

Analysis of the collected material shows that the inhabitants of Piła assess the condition of road lighting in 46.4% as good (Fig. 4). In contrast, 42.8% of respondents said that the lighting was in poor condition. The distribution of results is similar. Only a small number of people said that road lighting is in very good condition and 10.8% of respondents belonged to this group.

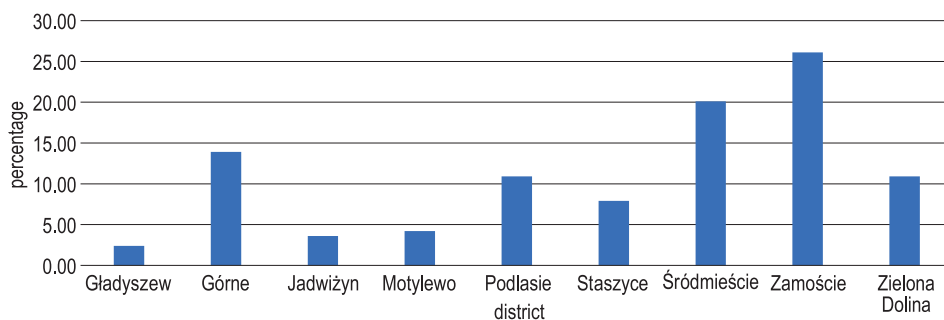


Fig. 3. Place of residence

Source: own elaboration.

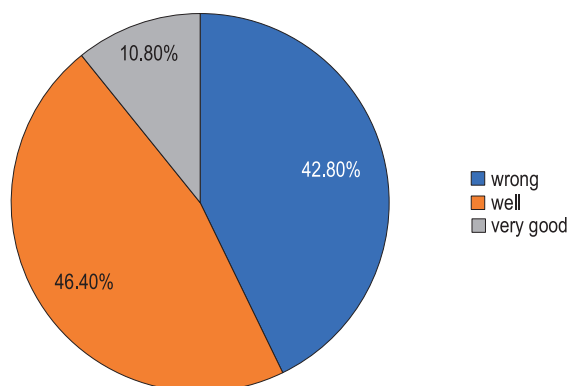


Fig. 4. Assessment of road lighting in the city of Piła

Source: own elaboration.

Research results on lighting bicycle paths in the city of Piła turned out to be very surprising (Fig. 5). The vast majority of respondents noted that the conditions regarding path lighting are good. 54.2% of respondents belonged to them. The remaining group of residents, as many as 34.9% declared that lighting along bicycle paths should be improved. A group of 10.9% of people confirmed that the lighting condition is unqualified. In the “Other answer” heading, respondents replied that the lighting of bicycle paths is very average and the level of lighting depends on the place.

Research clearly shows that there is a need for investment in lighting for pedestrian crossings in the city of Piła (Fig. 6). The result is so serious that renovation and increased work on lighting these places in the city are required. 68.1% of respondents found it difficult to navigate in these places. The group of 27.1% of respondents included people who think that the lighting of pedestrian crossings in the city of Piła fulfills its tasks. Only a few (4.8%) of respondents said that lighting was assessed in very good condition. Many people said in writing

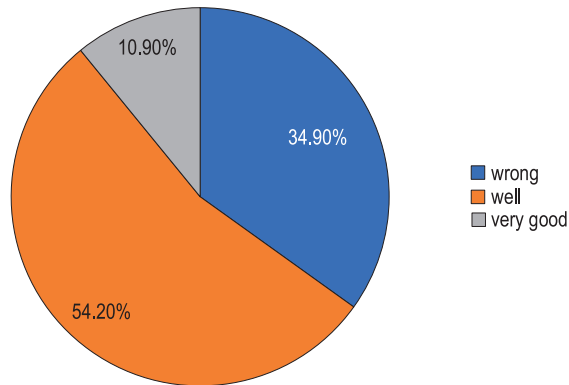


Fig. 5. Assessment of cycling path lighting in the city of Pila

Source: own elaboration.

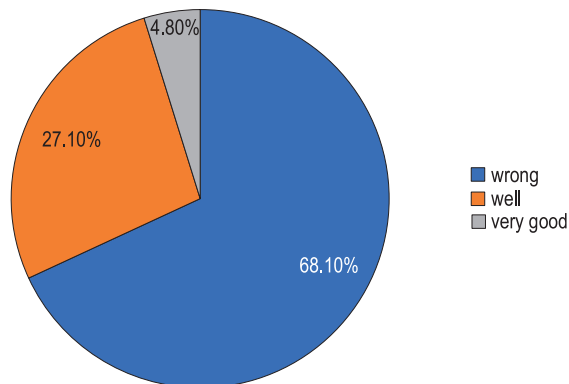


Fig. 6. Rating of lighting for pedestrian crossings in the city of Pila

Source: own elaboration.

that there is a need for illuminated pedestrian crossings in a dozen or so places throughout the city where there is heavy traffic.

Another important issue is the assessment of bus stop lighting (Fig. 7). The analysis of the collected research material shows that more than half of the respondents concluded that bus stops are poorly lit. This is how 52.4% of people rated it. The second group includes people who have a different opinion and think that the lighting of bus stops in Pila is in good condition. Another group (6%) thinks that the lighting of the stops is in very good condition.

In the light of the conducted research, respondents in a greater percentage assess the lighting of pavements as bad (Fig. 8). 53.6% of people declared such an answer. Research shows that this is a significant result. In contrast, 41% of respondents believe that the lighting of sidewalks is in good condition, and only a small number (5.4%) believe that they are in very good condition.

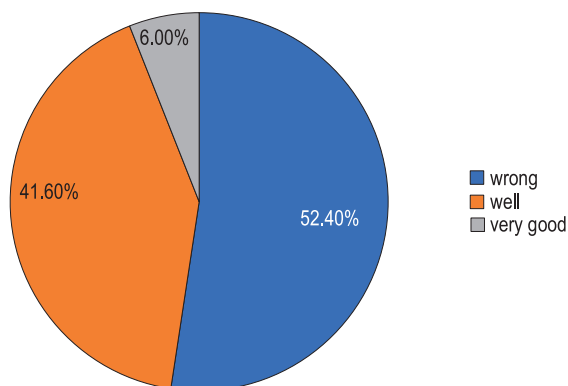


Fig. 7. Lighting assessment of bus stops in the city of Piła

Source: own elaboration.

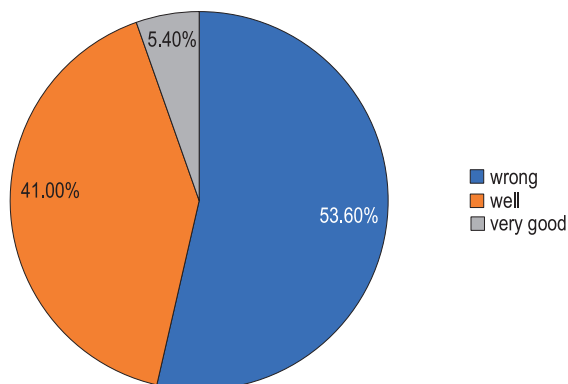


Fig. 8. Rating of pavement lighting in the city of Piła

Source: own elaboration.

The next, ninth question concerned places in the city of Piła, where road lighting does its job well. The answers were different depending on the resident's place of residence, but there were several statements that were largely repeated, i.e.

- street February 14, especially the promenade on this street – a large number, as much as 39% indicated this location;
- city center – 20% of votes;
- Mickiewiczza street – 6% of votes;
- Constitution Square – 6% of votes;
- park on the island – 4% of votes;
- Kossaka street – 4% of votes;
- Bydgoska street – 4% of votes;
- al. Powstańców Wielkopolskich – just like ul. Bydgoska won 4% of the vote;
- PKP station – 3% of votes.

The remaining places, which were indicated by the residents, won a maximum of 2% of votes. This is not strange, because the promenade on 14 Lutego Street has been recently renovated and is a showcase of the city.

The next question was quite the opposite of the previous one, because it concerned pointing to places in the city of Piła that are poorly lit. The largest number of responses concerned pedestrian crossings, streets outside the center, but also internal roads and housing estates. Below are those places which, according to residents, are the worst illuminated:

- pedestrian crossings – 27% of votes;
- places away from the center – 17% of votes;
- Bydgoska street – 7% of votes;
- Młodych street – 4% of votes;
- bus stops – 4% of votes;
- roads and pavements in housing estates – 4% of votes;
- al. Independence – 4% of votes;
- Street. Okólna – 4% of votes;
- Street. Wielkopolska Insurgents – 4% of votes.

The remaining number of places selected by respondents was a minority, below 3%.

Analysis of the collected material shows that the use of reflective elements is as follows (Fig. 9): 26.5% of respondents think that they are in favor of using reflective elements, while 27.1% of respondents are of the opinion that these elements are not needed. The above chart shows the percentage of how respondents responded, but by adding up the votes for and against, we can say that:

- 52.4% of respondents are in favor of using reflective elements;
- 40.4% of residents are not in favor of using reflective elements,

In the group, which consisted of 7.2%, there were undecided people.

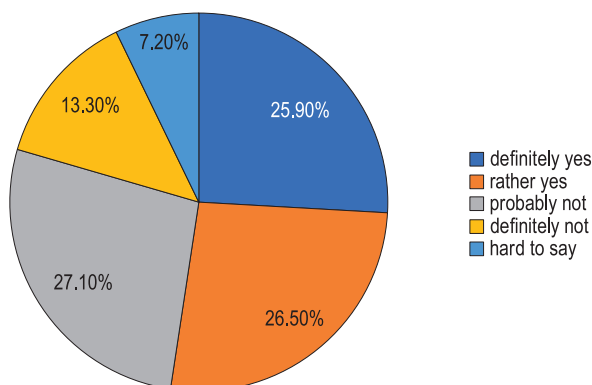


Fig. 9. Answers of the inhabitants of the city of Piła about the use of reflective elements on the sidewalk, road, bicycle path

Source: own elaboration.

The research results regarding the opinion of the inhabitants of the city of Piła about the introduction of solar lamps on the streets of Piła turned out to be very surprising (Fig. 10). The vast majority of respondents are in favor of introducing solar lamps, thanks to which the costs of lighting incurred by the City Hall would be reduced. 86.1% of respondents gave such an answer. There was also a group of people who were not favorable to this idea in the number of 4.2%. Few people declared that they have no opinion on this topic.

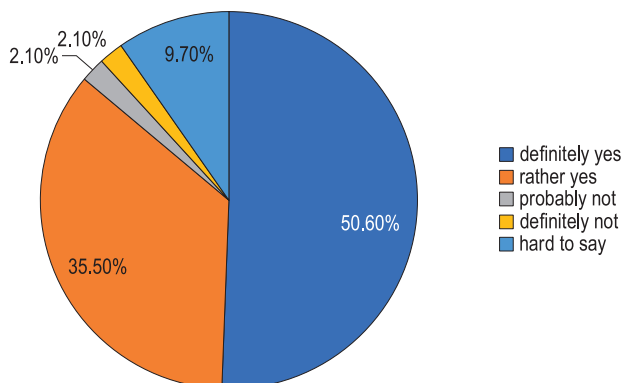


Fig. 10. Opinion of the inhabitants of the city of Piła about the introduction of solar lamps
Source: own elaboration.

In the next question, the survey results show that sentences are divided about lighting in the place of residence (Fig. 11). A positive opinion was expressed by 48.2% of respondents, while 45.2% said that lighting in front of their place of residence would not fulfill their function. There was also a group of people who could not answer this question – 6.6%.

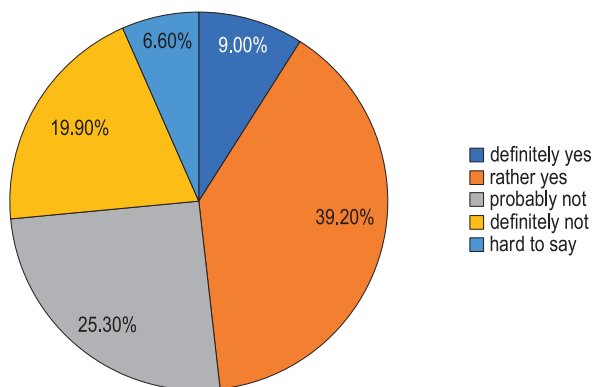


Fig. 11. Opinion of the inhabitants of the city of Piła about lighting in the place of residence
Source: own elaboration.

An important aspect in the research was the opinion of the city inhabitants regarding street lighting caused by a breakdown (Fig. 12). Failures occur once every six months in 39.2% of residents, followed by 33.1% of those surveyed failures occur once a year. Based on these values, it can be concluded that failures do not occur very often in Pila. Once a month, 18.1% of residents suffer a breakdown, while the smallest number of lighting damage occurs once a week.

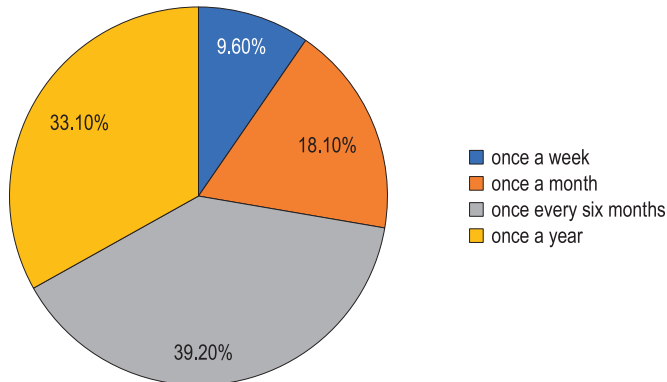


Fig. 12. Answers of the inhabitants of the city of Pila about the lack of street lighting caused by a breakdown

Source: own elaboration.

The next, fifteenth question concerned the introduction of intelligent lighting in the city (Fig. 13). The vast majority are for innovation in lighting. 77.1% of respondents gave such an answer. The group of 15.6% of respondents opposed this idea. The minority belongs to a group of people constituting 7.3% who think that it is difficult for them to comment on this topic, perhaps they have not heard about the news related to lighting.

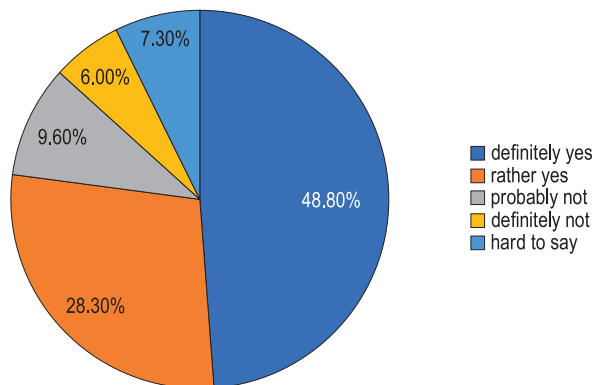


Fig. 13. Opinions of Pila residents regarding the introduction of intelligent lighting

Source: own elaboration.

To conclude on lighting, let's analyze the last question in the questionnaire. In this question, the respondents had to provide comments on the functioning of lighting in the city of Piła. From among 167 answers, the most frequently repeated were chosen. Respondents indicated comments such as:

- undoubtedly the largest number of people indicated the lack or poorly lit pedestrian crossings;
- a group of people said that old lighting should be replaced with a new, better technology, e.g. LED fixtures;
- many respondents indicated the poor functioning of the current lighting, i.e. high failure rate, lighting operation during the day, in the autumn time too late switching on of the lamps, wrong setting of the lamps (they do not illuminate these places what they should), many lighting fittings dirty requiring refreshing;
- there was also a group of people who indicated the lack of lighting in some places, in particular: on housing estate roads leading to blocks of flats, at playgrounds, by trashcans.

The inhabitants of the city of Piła expressed their opinions on the subject of road lighting divided into two almost equal groups. It is not possible to say 100% whether lighting in the city of Piła is effective because the survey results are divided. Some respondents believe that road lighting is good and effective. The second part of the respondents claims that lighting does not fulfill its functions, tasks and something should be changed in this matter. There are several streets that are simultaneously served as well and poorly lit, which is why it is impossible to clearly determine the efficiency of street lighting in these places. There is also a group of respondents who pay attention to the fact that lighting is not working properly, i.e. it is out of order for a long time. This may result from the ignorance of these people that all failures and damages should be reported to the Piła City Hall.

The Concept of Modification of Road Lighting in the City of Piła

Lighting of pedestrian crossings

One of several solutions to improve the efficiency of road lighting in the city of Piła is to use better lighting at pedestrian crossings. According to more than half of respondents (62% of those surveyed), pedestrian crossings in Piła are poorly lit. The introduction of illuminated pedestrian crossings will definitely improve safety in this city.

Pedestrian crossing lighting should consist of: a complete lighting system that includes: a lighting fixture and a pole and/or boom configuration, thanks to which it is possible to obtain the assumed lighting parameters (a fixed lighting

class). There are several types of lighting for pedestrian crossings: standard and dedicated. Standard lighting – this is a technical type of lighting for road sections, intersections and other elements of road infrastructure. It is implemented with the help of various lighting solutions, i.e. distribution of light streams from luminaires along the road, e.g. linearly in one-sided structure (on sections of roads and streets), but also locally at road intersections and complex road systems (the use of a mast system ensuring lighting area). Dedicated lighting – it is a type of technical solution for pedestrian crossing lighting using lighting consisting in the use of lighting fittings with asymmetrical light distribution, located in the appropriate configuration (*Wytyczne organizacji bezpiecznego ruchu pieszych...*, 2017).

According to data on improving road lighting performance and urban traffic safety, the light color of an illuminated pedestrian crossing should be different from that of street lighting. With a different color, drivers perceive them as different, which encourages them to pay more attention. In addition, they believe that the level of lighting at pedestrian crossings should be significantly increased, which will have a positive impact on pedestrian safety (*Wytyczne organizacji bezpiecznego ruchu pieszych...*, 2017).

The use of led technology

Another solution to improve the efficiency of road lighting in the city of Pila is the use of LED luminaires. LED (Light Emitting Diode) technology is the latest lighting technology, thanks to which the city of Pila can significantly reduce energy costs incurred for road lighting. The use of LED luminaires is more energy efficient than other solutions, and has many additional features that result in a significant reduction in the said costs.

The quality of lighting is not only dependent on the light source, but largely depends on the quality of the lighting fixture used. An effective luminaire should have high technical parameters that guarantee high tightness of the optical and electrical system. It should also limit the occurrence of glare. The most important factor in the replacement or use of new LED luminaires is the financial aspect. By replacing lighting with LED technology, the city gains huge benefits, as the lighting costs in each city's budget are one of the biggest burdens. The use of LED street lighting is currently one of the rational solutions (*Audyt...*, 2016).

Road lighting control system

The next proposal to modify road lighting in the city of Pila is to use a road lighting control system. This is another solution reducing the costs incurred by the city for road lighting.

The principle of this system is to reduce the illuminance when there is no pedestrian or vehicle traffic on the road. In the situation when users appear on a given section of the road, the system increases the illuminance. The increase in lighting level is only raised on the designated road length, i.e. in front of and behind the road user. After some time, when there is no movement within the range of a given lamp (the user has left the road), the system reduces lighting intensity to several percent of its power. Only as many luminaires as needed are needed to properly perform the visual task by the motion user. A given luminaire that works in a concurrent lighting system is smoothly switched on at an optimal distance in front of the oncoming vehicle. It lights up to the designated moment, which results from previously adopted guidelines, after which (unless the next road user is approaching) it proceeds smoothly dim. The distance of the section illuminated in front of the road user depends mainly on the speed of vehicle movement. This measure is adapted to the maximum permissible speed in a given place. The lamp's illumination and dimming are very gentle to give a smooth impression (Goc *et al.*, 2010)

Conclusions

Road lighting is an inseparable element accompanying society in the evening and at night. It is an element of road infrastructure that should be effective and fulfill its function well, as health and human life may depend on its functioning.

The main purpose of the article was to assess the efficiency of street lighting in the city of Piła. The analysis was conducted on the basis of a questionnaire survey. Respondents had to express opinions on the functioning of road lighting in the city. They consisted of 13 multiple-choice and 3 open-ended questions. In total, 167 people responded. Thanks to the results obtained, conclusions were drawn about the functioning of lighting and in the fifth chapter several solutions were proposed that could improve the efficiency of this lighting.

First and foremost, the city of Piła should replace more and more luminaires, ultimately seeking to use LED luminaires throughout the city, which significantly reduce electricity costs. In the street lighting modification section, three innovative, energy-saving, modern proposals for Piła have been described, thanks to which the city can gain many benefits. The above-mentioned solutions were the most repetitive answers indicated by the respondents.

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FOREIGN DIRECT INVESTMENTS IN POLAND AGAINST COUNTRIES OF VISEGRAD GROUP

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Key words: foreign direct investment, Poland, Central and Eastern Europe, IDP theory.

Abstract

In the period of scarcity of investment capital, foreign direct investment (FDI) is an important source of its acquisition. These investments flow to the host countries in various conditions and consequences for the economy. The concept of linking the country's position in terms of inflow and outflow of foreign direct investments with its economic development is the concept of the investment and development path – IDP (The Investment Development Path). The article diagnoses changes in the value of foreign direct investment in Poland against economies of Visegrad Group in 1995-2020, taking into account the effects of the pandemic on changes in FDI flows in 2016-2021. Against this background, the development of the Polish economy was diagnosed in the light of the path theory (IDP).

The analysis covers the years 1995-2020 and 2016-2021 and uses data from UNCTAD and the World Bank. In the periods selected for the analysis, one can notice definitely different dynamics

of changes in the value of FDI liabilities. The reaction of foreign investors in selected location markets varied during the pandemic. The diversification of the cumulative value of FDI receivables for individual countries is significant. During the pandemic, investors reacted to the situation in different ways. Among the selected countries, an increase in the value of FDI undertaken abroad was recorded in Slovakia and the Czech Republic. Polish investors and investors from Hungary made investments with lower values than in 2020. In all years, NOIP for Poland takes negative values, so the level of FDI undertaken in Poland exceeds the level of investments undertaken abroad. Identifying the transition to one of the most important stages on the IDP path – stage III is difficult. It is debatable to determine the period in which Poland entered such a stage. This results, among others, from low FDI. It is indicated that this is a period from 2004 to even 2013.

BEZPOŚREDNIE INWESTYCJE ZAGRANICZNE W POLSCE NA TLE KRAJÓW GRUPY WYSZEHRADZKIEJ

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Kody JEL: F21, F23, O19.

Słowa kluczowe: bezpośrednie inwestycje zagraniczne, Polska, Grupa Wyszehradzka, teoria IDP.

Abstrakt

W okresie niedoboru kapitału inwestycyjnego istotnym źródłem jego pozyskiwania są bezpośrednie inwestycje zagraniczne (BIZ). Inwestycje te napływają do krajów goszczących w różnych uwarunkowaniach i z różnymi konsekwencjami dla gospodarki. Koncepcją powiązania pozycji kraju pod względem napływu i wypływu bezpośrednich inwestycji zagranicznych z jego rozwojem gospodarczym jest koncepcja ścieżki inwestycyjno-rozwojowej – IDP (The Investment Development Path). W artykule zdiagnozowano zmiany wartości bezpośrednich inwestycji zagranicznych w Polsce na tle gospodarek krajów Grupy Wyszehradzkiej w latach 1995-2020 z uwzględnieniem skutków pandemii dla zmian przepływu BIZ w latach 2016-2021. Na tym tle zdiagnozowano rozwój polskiej gospodarki w świetle teorii ścieżki (IDP).

Analiza obejmuje lata 1995-2020 i 2016-2021; wykorzystano w niej dane UNCTAD oraz Banku Światowego. W wybranych do analizy okresach można zauważyć zdecydowanie różną dynamikę zmian wartości zobowiązań z tytułu BIZ. Reakcja inwestorów zagranicznych na wybranych rynkach lokalizacji była zróżnicowana w okresie pandemii. Zróżnicowanie skumulowanych wartości

należności z tytułu BIZ dla poszczególnych krajów jest znaczne. W okresie pandemii inwestorzy w różny sposób reagowali na zaistniałą sytuację. Wśród wybranych krajów wzrost wartości BIZ podejmowanych za granicą odnotowano na Słowacji oraz w Czechach. Polscy inwestorzy oraz inwestorzy z Węgier zrealizowali inwestycje o niższych wartościach niż w 2020 r. We wszystkich latach NOIP dla Polski przybiera wartości ujemne, a więc poziom BIZ podejmowanych w Polsce przekracza poziom inwestycji podejmowanych za granicą. Identyfikacja przejścia do jednego z najważniejszych etapów na ścieżce IDP – etapu III – jest trudna. Dyskusyjne jest określenie okresu, w którym Polska weszła w taki etap. Wynika to m.in. z niskiego poziomu BIZ. Wskazuje się, że jest to okres od 2004 r. do nawet 2013 r.

Introduction

One of the most important issues that encourage studying direct foreign investment (FDI) is the impact of such investment on economic growth and development (Bojar, 2001; Gorynia *et al.*, 2006; Jaworek, 2006; Karaszewski, 2004; Lizińska & Marks-Bielska, 2014; Ozawa, 2002; Witkowska, 2006). Investments are a significant component of the process of shaping economic conditions (Nowak & Ryć 2002; Próchniak & Rapacki 2012). Furthermore, the recent years of the COVID-19 pandemic have demonstrated that the macroeconomic and investment situation in many countries, including the EU member states, has deteriorated and that there are still considerable disproportions between groups of countries in terms of their development and economy (Pukin & Markowski, 2022).

As emphasized in the World Investment Report (2021), the crisis caused by the Sars-CoV-2 virus resulted in a drastic decline in foreign direct investment in 2020. The global FDI flows decreased by 35% (from 1.5 trillion USD in 2019 to 1 trillion USD in 2020). This decline differed significantly from the one recorded in 2009, after the global financial crisis. It is also underlined that the consequences of the COVID-19 pandemic were particularly harsh in economically developed countries, where the FDI values fell down by as much as 58%.

The article diagnoses changes in values of foreign direct investment in Poland relative to the other countries of the Visegrad Group in years 1995-2020, including the impact of the pandemic on changes in the FDI flows in years 2016-2021. Against this background, a diagnosis of the Polish economy development was made in the light of the investment-development path (IDP) theory.

For the purposes of this analysis of changes in FDI values, data issued by the UNCTAD in its cyclic World Investment Reports were extracted. An analysis of changes in foreign direct investment inward stock and outward stock in the selected years 1995-2020 and the dynamics of these changes were included. The analysis covered Poland and three countries of Visegrad Group: Czechia, Slovakia and Hungary.

The analysis also included the identification of changes in FDI flows in the selected countries in years 2016-2021, and the aim was to determine changes in FDI flows during the pandemic.

An in-depth diagnosis aimed to identify phases in Poland's economic development according to the investment-development path (IDP) interpretation. The indicator that served to distinguish stages in Poland's development in line to the investment-development path (IDP) was the NOIP index (net outward investment position) (Lizińska, 2012; Lizińska & Marks-Bielska, 2014), calculated from the formula:

$$\text{NOIP} = \text{OFDI} - \text{IFDI},$$

where:

- NOIP – net outward investment position,
- OFDI – outward foreign direct investments,
- IFDI – inward foreign direct investments.

Based on the mutual shaping of FDI import and export, a pathway of transition to subsequent economic development stages was identified. In cases where the moment of passing onto the next stage was impossible to identify unambiguously with the NOIP index alone, an additional indicator was employed, such as the OPI (outward FDI performance index):

$$\text{OPI} = (\text{FDI outflowing from the country/global FDI outflows}) / (\text{GDP of the country/global GDP}).$$

This index expresses the share of domestic FDI in the global flows to the country's share in the global GDP. Values of the index close or higher than 1 in a given time period are an implication that this was the moment of transition to the subsequent development phase on the IDP (Lizińska & Marks-Bielska, 2014).

The time span considered in the research depended on the availability and timeliness of the data presented in international statistics and on the research aim, which was to indicate the impact of the first year of the pandemic on FDI flows. Data on values of the GDP per capita (in current prices) were obtained from World Bank.

Literature Review

In a situation where accumulation of internal savings is difficult, a deficit in domestic financial capital might be offset by an inflow of funds from abroad, especially as foreign direct investment. Capital flows between countries in this form gained special importance in the global economy in the 20th century (Dziemianowicz & Jałowiecki 2004; Marelli *et al.*, 2014).

On the one hand, there is no direct evidence that FDI affects the rate of changes in economic growth (Gwiazda, 1998); on the other hand, broad

benefits arising from the influx of such investments are indicated (Mączyńska, 1999). Foreign direct investment is the main element of supplementing capital shortages in economies (Karaszewski, 2004; Jaworek, 2006), as well as being a source of creating new jobs (Gorynia *et al.*, 2006; Wawrzyniak, 2017; Witkowska, 2000), stimulating new exports (Cieślik, 2016; Nazarczuk *et al.*, 2020a, 2020b; Shmarlouskaya, 2021), and transferring knowledge and technology (Kuzel, 2017). At the same time, the role of FDI in finances, competitiveness of enterprises, connections with local companies and communities and even ecology is suggested (Adler & Stevens, 1974; Lin, 1995; Bojar, 2001, Karaszewski, 2004; Kojima, 2000; Ozawa, 1992; Pakulska & Poniatowska-Jaksch, 2004).

In any discussion on the influence of FDI on economies of receiving countries, and especially less developed ones, it is indicated that while the primary role of FDI in economic development does not change in a globalized world, there is a greater variety of the types of FDI, benefits it provides and ways in which it affects the receiving country's economy (Witkowska, 1996). Economic experience suggests that countries with a low level of incoming FDI are characterized by the growing developmental distance to countries which gain new developmental opportunities owing to FDI and which allow these tendencies to consolidate (Karaszewski & Jaworek, 2022; Lizińska, 2012).

Although some effects of the capital inflow in the form of FDI may be negative, it is generally thought that the influx of capital stimulates the economic development of capital host countries (Owczarczuk, 2020).

If one agrees with the assertion, found in the subject literature, that benefits from the influx of foreign capital in the form of FDI outweigh risks, it is worth bearing in mind the fact that a decision of a foreign investor to make a direct investment depends on many diverse and specific location factors. For international production to emerge, specific resources and skills that create a company's sustainable competitive advantage must be combined with the location assets in the other country (Batra *et al.*, 2003; Blomström, 2006; Cieślik & Hien Tran, 2019; Dollar *et al.*, 2006; Kikeri *et al.*, 2006; Marks-Bielska *et al.*, 2014; Misala, 2015; Nazarczuk & Lizińska, 2009; Pilarska, 2005).

The concept of the investment development path (IDP), developed by J.H. Dunning and P.J. Buckley in 1975 as expansion of the eclectic theory of foreign direct investment (Buckley & Castro, 1998; Dunning, 1981), is a concept related to linking the country's position in terms of received and undertaken FDI and its economic development. This theory explains the process of transition through consecutive phases of a country's economic development (Lizińska, 2012). The IDP concept envisages five stages in the economic development of a country, closely related to the degree of internationalization of companies. The basis for the division of a country's economic development into the so-called phases are different combinations of levels of GDP per capita and the net investment position per capita (Dunning, 1980; Dunning & Narula, 1996; Duran & Ubeda, 2001; Lizińska & Marks-Bielska, 2014; Narula, 1996; Narula & Guimon, 2010).

Successive transition of the economy of a country receiving foreign direct investment through consecutive phases on the investment-development path is a complex process that proceeds in steps over time. It is described by characteristic relationships between variables indicated in the IDP assumptions. However, these relatively orderly changes are simultaneously accompanied by specific periods in FDI flows induced by increased investment uncertainty. Making investments during such times appears riskier and may incline investors to limit their investing activity. This might take the form of reducing the inflow of FDI (e.g. lack of new FDI) or divestment (Nowara, 2013). The propensity for such attitudes is typically stronger in a period of greater economic or political turbulences, which contribute to higher investment uncertainty and hence a higher risk of an entire investment project (Salamaga, 2020).

Results

Our analysis of changes in the value of foreign capital flowing to the Visegrad Group countries suggests that the countries which clearly dominated in 2020 in terms of FDI inward stock were Poland and the Czechia (Fig. 1). There was also a discernable trend of the growing value of inward stock in Czechia between 2015 and 2020. When FDI inflow is expressed in absolute values, it is only possible to identify the position of analyzed countries in terms of the saturation of their economies with foreign capital. This approach does not take into account the potential of individual economies, although it enables one to identify countries which receive the most of FDI.

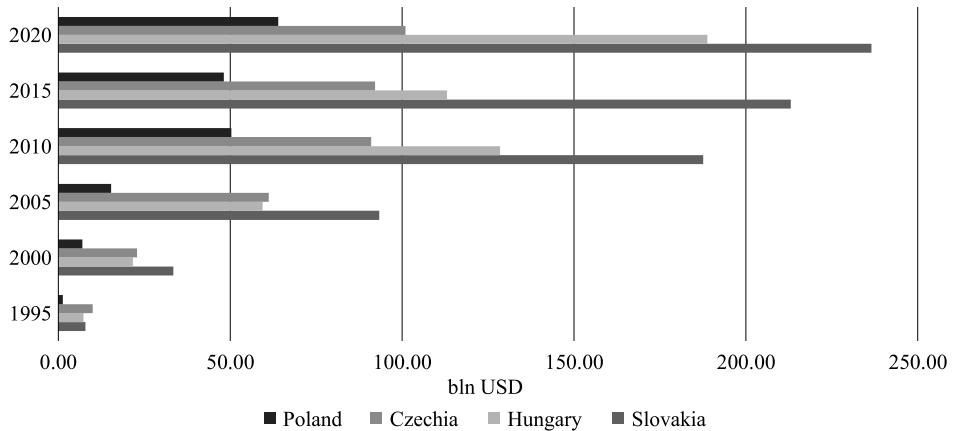


Fig. 1. FDI inward stock in selected years 1995-2020

Source: own elaboration based on data published by UNCTAD: World Investment Report (for years 1995-2020).

Regarding the FDI determinants, legal regulations affecting incoming foreign capital were first passed in Poland in the early 1990s. Next to domestic law, other important elements creating a specific legal and administrative climate for the inflow of foreign capital are composed of international agreements, in addition to another act of law regulating the rules for companies with foreign capital willing to start business activity (Karaszewski, 2004). These laws resulted in an increase in the FDI inflow.

During the time periods chosen for analysis, it was possible to observe much different dynamics of changes in FDI inward stock. On average for all the countries, the highest growth in inward stock was noted in years 2000/1995, 2005/2000 and 2010/2005. Years 2015/2010 and 2020/2015 mark a demonstrably lower rate of growth in FDI inward stock (Fig. 2).

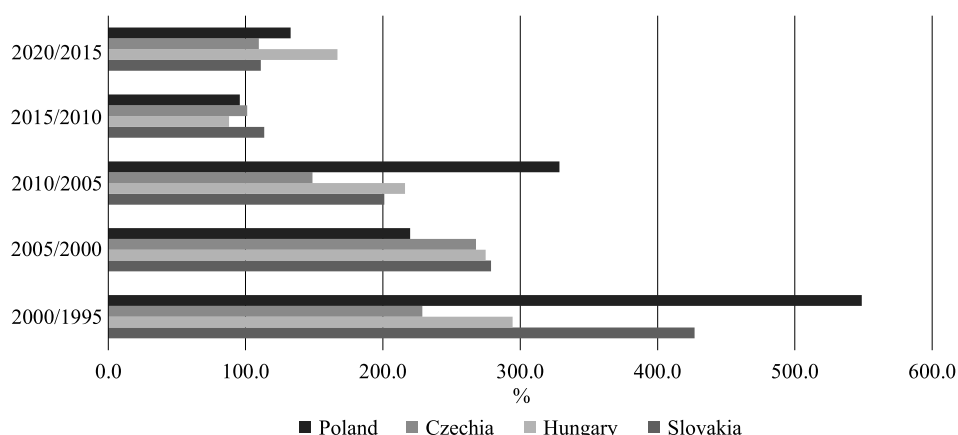


Fig. 2. Indicators of the dynamics of FDI inward stock in selected years 1995-2020

Source: own elaboration based on data published by UNCTAD: World Investment Report (for years 1995-2020).

Certainly, the countries in Central and Eastern Europe (including Poland) were in a specific situation regarding the conditions for FDI inflows. After decades of functioning in a different system, they entered market economy. In 1989, they began the transformation of their governance and economy, opening the door to foreign investors. The specific character of this whole group of countries arose from the fact that their development associated with the adoption of market economy rules was very rapid, and the transition to subsequent phases took very little time (Kola & Kuzel, 2007, p. 171, 172; Lizińska & Żróbek-Różańska, 2007, p. 125, 126).

Our detailed analysis of the undertaken FDI included an overview of changes in the inflow of capital in 2016-2021. This time period enabled an in-depth diagnosis in the context of the pandemic and its effects. As demonstrated by

the data illustrated in Figure 3, the response of foreign investors in selected location markets varied over the pandemic time. In the first year of the COVID-19 pandemic, foreign capital was withdrawing in Slovakia, whereas in the other countries there was only a slight decrease in undertaken foreign investment projects (the Czech Republic) or even a rise in its value (Poland and Hungary). The first year of the pandemic was definitely prohibitive to rapid and firm adaptations in investment plans, although a distinct change occurred in 2021 as regards the value of FDI relative to the previous years. For example, a significant increase in the investment located in Poland was recorded (nearly double the value in 2020). As follows from data provided in the World Investment Report (World..., 2022), most of developed countries, namely 34 out of 48, recorded an increase in the FDI value in 2021. The overall increase, however, was characterized by high fluctuations in FDI flows arising from restructuring as well as mergers and takeovers of companies. Among the global subregions, FDI flows increased in North America, some European countries outside the EU and in other developed countries, while decreasing in the EU member states. It needs to be highlighted that in 2022-2021 Poland belonged to 20 biggest FDI receiving economies as regarded the value of inflowing FDI.

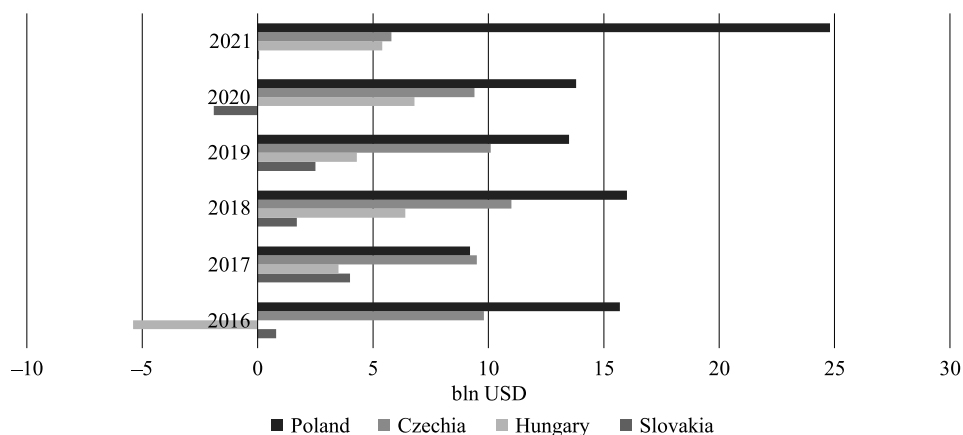


Fig. 3. Changes in the value of FDI inflow in years 2016-2021

Source: own elaboration based on data published by UNCTAD: World Investment Report (for years 1995-2020).

The pandemic stimulated the demand for digital infrastructure and services all over the world. This led to a rise in the value of greenfield FDI addressed to the ICT sector by over 22%, to the value of 81 billion US dollars. The major investment projects in this branch included a contract worth of 6 billion US dollars and signed by Telefónica (Spain), development of a fiber optic network in Germany, an investment by Amazon (the USA) worth 2.8 billion US dollars into

the teleinformation infrastructure in India, and 1.8 billion-dollar investment project executed by Alphabet (the USA) in Poland (World..., 2021).

Another significant element that helps to characterize countries with respect to FDI and to position them on the investment-development path is the level of business activity of domestic companies on international markets. This stage is typical for the economies in which companies which possess and are aware of their advantages (related to own property, location, internalization, etc.) decide to launch business activity abroad, and are able to operate efficiently on foreign markets. The basic measure that enable the identification of the scale of pursued foreign investments by residents of countries submitted to analysis is the cumulative balance of receivables due to FDI.

The data shown in Figure 4 demonstrate that differences in cumulative FDI receivables between particular countries are even greater. In the group of countries submitted to our study, the ones dominating in this respect are Poland, the Czech Republic and Hungary. The highest dynamics of changes in the value of receivables, defined as the average for all the countries, appeared in years 2010/2005 (Fig. 4).

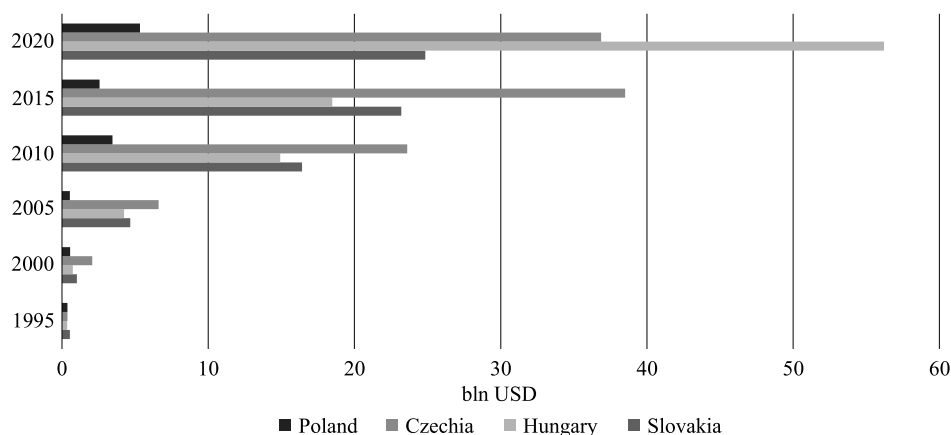


Fig. 4. FDI outward stock in selected years 1995-2020

Source: own elaboration based on data published by UNCTAD: World Investment Report (for years 1995-2020).

In years 2000/1995, the highest dynamics of growth was noted in Hungary. In years 2005/2000, a relative high dynamics in the growth of FDI outward stock was observed in 3 countries: Poland, Hungary and the Czech Republic, while in the subsequent period of analysis, 2010/2015, the highest growth dynamics was recorded in Slovakia. In the two later periods, 2015/2010 and 2020/2015, the dynamics of the FDI outward stock growth was not as high as in the earlier periods (Fig. 5).

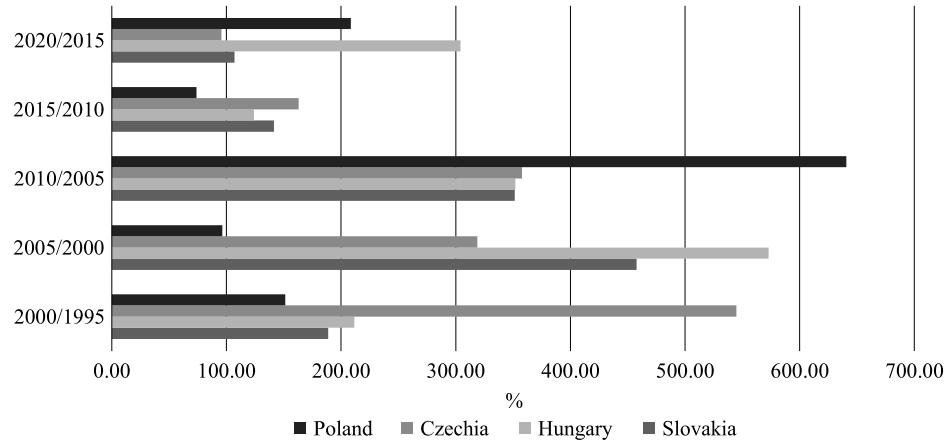


Fig. 5. Indicators of the dynamics of FDI outward stock in selected years 1995-2020
Source: own elaboration based on data published by UNCTAD: World Investment Report (for years 1995-2020).

During the pandemics, investors from the selected countries responded differently to the situation. Among the analyzed countries, the growth in the value of FDI undertaken abroad was noted in Slovakia (a small increase from 235 million USD to 389 million USD) and in the Czech Republic (from less than 3 billion USD to 5.6 billion USD). Polish and Hungarian investors made investments of lower value than in 2020 (Fig. 6).

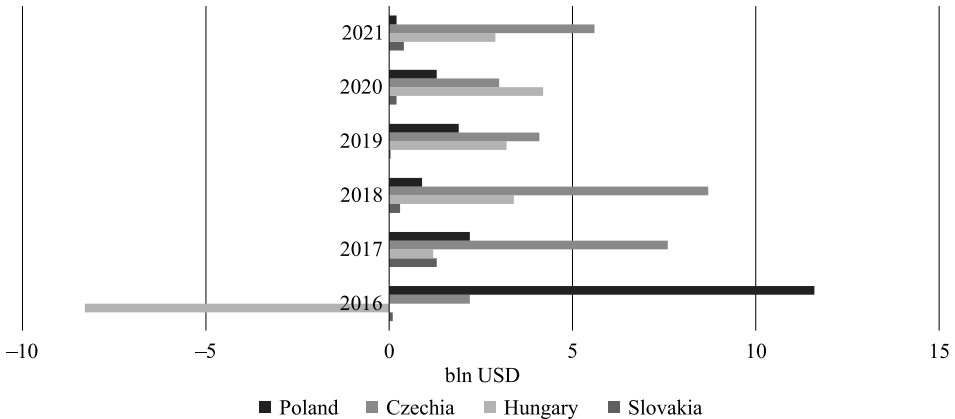


Fig. 6. Changes in the value of FDI outflow in years 2016-2021
Source: own elaboration based on data published by UNCTAD: World Investment Report (for years 1995-2020).

As revealed by the UNCTAD data (World..., 2022), multinational companies from developed economy more than doubled their investment abroad in 2021. Their share in the global outward FDI increased to three quarters of world's outflows. Aggregated foreign investment by European multinational companies rebounded from the inordinately low level in 2020, equal -21 billion USD, up to 552 billion USD.

In accordance to the assumptions of the investment-development path, relative values (per capita) were employed in order to locate the Polish economy relative to the shaping of the net investment index. Figure 7 illustrates FDI liabilities (IFDI) and receivables (OFDI) and the net outward investment position per capita (NOIP). In all the years, the NOIP index assumed negative values, meaning that the level of foreign direct investment executed in Poland surpassed the level of investments carried out abroad. In 1995, values of FDI flows in both directions were small. However, because of the level of inward foreign direct investment being higher, it was possible to identify the economy as located in the first phase of development, according to the definition in the IDP concept. The entry into the second phase of development, according to IDP, should be characterized by an increase in the rate of FDI inflows and therefore the negative value of net investment value should deepen. The moment the level of inward FDI begins to grow more rapidly than before, countries are beginning to transition to the second phase of IDP-defined development. In Poland, this moment could be identified as taking place in 1998.

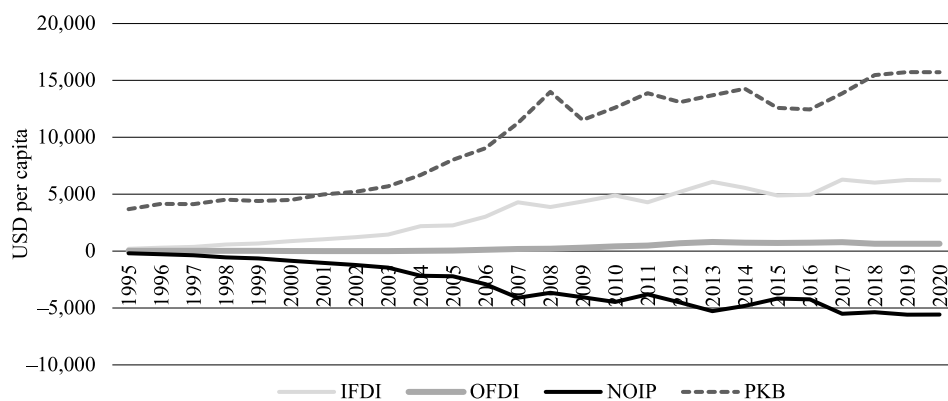


Fig. 7. NOIP and GDP per capita in Poland in period 1995-2020 (USD)

Source: own elaboration based on data published by UNCTAD: World Investment Report (for years 1995-2020).

One of the periods distinguished in the IDP concept that is most difficult to identify is the moment of entering the third IDP stage. The OPI index is employed in order to facilitate the above identification. This index reflects two sets of factors, which indirectly indicate which country has a chance of nearing the third phase on the investment-development path.

Because of the growing dynamics of the outflow of FDI in years 2004-2013 and a growth in the value of the OPI in years 2004-2005, this could be considered as the onset of entering into phase three. In the light of the adopted investment-development path assumptions, it is impossible to state unanimously whether Poland moved from the second to the third phase in that time. However, it is possible to state that it neared this stage on the investment-development path in early 2004 (Fig. 8).

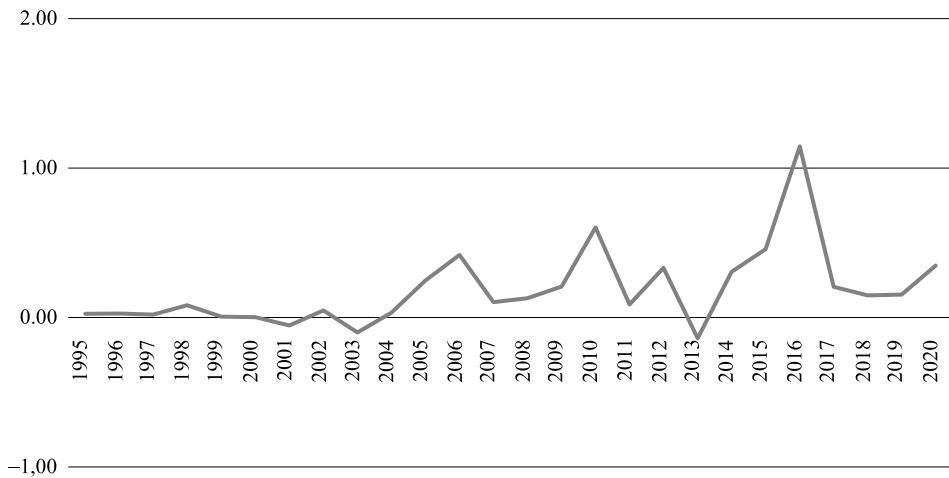


Fig. 8. Value of OPI index in Poland (1995-2020)

Source: own elaboration based on data published by UNCTADSTAT (online).

Depending on the adopted assumptions, the available studies on the subject raised in this paper suggest that the time needed for a country to move onto the next stages in development, as defined in the IDP concept, varies. Also, the achievement of a specific phase by particular countries appears to be a heterogenous event. According to Gorynia *et al.* (2010, p. 13, 14), Poland had not reached the third phase of the IDP by year 2006. Under similar circumstances, Kola and Kuzel (2007, p. 183-185) indicated that year 2004 marked the beginning of Poland entering the third stage of development. According to Stawicka (2008), Poland was at the onset of the third stage of development in 2006. In another paper, Gorynia *et al.* (2019, p. 25, 26) and Kuzel (2017) suggested that Poland had not reached the third phase of development until 2013.

Summary

In the periods and countries chosen for the analysis, values of receivables owing to the inflowing foreign capital in the form of direct investment can be seen to vary highly. The dynamics of changes in the said values is likewise varied. This could have resulted from the different economic potential of the analyzed countries, and from changes in the legal regulations governing the influx of foreign capital. Obviously, an important event in the shaping of conditions which determine the influx of FDI was the integration with the European Union.

The high sensitivity of foreign investors in a time of a higher investment risk, emphasized in the literature, was noticeable during the pandemic. The response of foreign investors observed in the location markets selected for this study varied during the pandemic time. In Slovakia, the foreign capital was withdrawing from that country in the first pandemic year, while the value of investments undertaken by foreign investors in the Czech Republic declined only slightly, and even increased in Poland and Hungary. In 2021, an evident change occurred in the FDI value relative to the previous years. For example, there was a significant increase in the investment in Poland.

The variation in the cumulative values of FDI outward stock among the analyzed countries was significant. The highest dynamics of changes in the values of FDI outward stock determined as the average for all the countries was revealed in the period of 2010/2005. During the pandemic, investors responded to the developing situation in different ways. Among the analyzed countries, an increase in the value of FDI undertaken abroad was noted in Slovakia and the Czech Republic. Polish and Hungarian investors realized investments of a lower value than in 2020.

In all the analyzed years, the NOIP for Poland had negative values, meaning that the level of FDI undertake in Poland surpassed the level of investments pursued abroad. The identification of the moment of a country's transition to one of the most important phases on the investment-development path, i.e. phase three, is difficult. It is debatable when Poland actually entered this stage. One of the reasons for doubts is the low level of FDI. Researchers suggest it may have happened sometime between 2004 up to 2013.

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MODERN NEUROIMAGING METHODS IN CONTEMPORARY NEUROECONOMICS AND NEUROMANAGEMENT

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JEL Classification: D87, D91, A12, C90, M31.

Key words: neuroeconomics, neuromanagement, neuromarketing, functional magnetic resonance imaging (fMRI), electroencephalography (EEG).

Abstract

In the modern world, an interdisciplinary approach is required to study the psychological and economic underpinnings of market phenomena as well as the behaviors and attitudes of market actors. Neuroscience plays an increasingly important role in the identification of brain correlates of decision-making processes in research and business. The aim of this study was to present modern neuroimaging methods that are most widely used in economic sciences and management, and to determine their theoretical and practical relevance. The study provides a theoretical background for empirical research that can be conducted independently. Research into consumer behavior should involve an interdisciplinary approach, therefore selected literature on neuroeconomics and neuromarketing was reviewed. The role of neuroimaging was synthetically described, the results of selected research studies were presented, and the implications of functional magnetic resonance imaging (fMRI) and electroencephalography (EEG) for neurofinance, neuromarketing, and neuromanagement were analyzed.

The purpose of the literature review was to emphasize the growing significance of a holistic approach to consumer research and to discuss the applicability of fMRI and EEG in economic research. In business, both neuroimaging methods can be applied to optimize products and services to ensure that they meet customer needs and preferences. Neuroimaging techniques have many advantages, but attention should also be paid to ethical considerations in research and commercialization of research results.

NOWOCZESNE METODY NEUROOBRAZOWANIA WE WSPÓŁCZESNEJ NEUROEKONOMII I NEUROZARZĄDZANIU

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Kod JEL: D87, D91, A12, C90, M31.

Słowa kluczowe: neuroekonomia, neurozarządzanie, neuromarketing, funkcjonalny rezonans magnetyczny (fMRI), elektroencefalografia (EEG).

Abstrakt

Współczesne realia społeczno-gospodarcze implikują interdyscyplinarne podejście badawcze do psychologiczno-ekonomicznych uwarunkowań zjawisk i zachowań podmiotów rynkowych. Coraz większą rolę w identyfikacji mózgowych korelatów procesów decyzyjnych na gruncie naukowym i biznesowym odgrywa neuronauka. Celem artykułu jest przedstawienie nowoczesnych metod neuroobrazowania stosowanych najczęściej na gruncie ekonomii i zarządzania, a także określenie ich użyteczności w aspekcie poznawczym i aplikacyjnym. Artykuł ma charakter teoretycznych rozważań i stanowi tło teoretyczne do przeprowadzenia własnych badań empirycznych. Mając na uwadze konieczność interdyscyplinarnego podejścia do badania zachowań konsumenckich, dokonano przeglądu wybranej literatury przedmiotu z zakresu neuroekonomii i neurozarządzania. Syntetycznie scharakteryzowano istotę neuroobrazowania, przedstawiono wybrane wyniki badań, a także możliwość wykorzystania metody funkcjonalnego rezonansu magnetycznego (fMRI) i elektroencefalografii (EEG) w obszarze neurofinansów, neuromarketingu i neurozarządzania.

Badania literaturowe służyły podkreśleniu rosnącej roli holistycznego podejścia badawczego do analizy konsumenta oraz ukazaniu przydatności metody fMRI i EEG na gruncie badań ekonomicznych. Praktycznym aspektem wykorzystania metody fMRI i EEG w sferze biznesowej jest możliwość optymalnego dostosowania oferty produktowo-usługowej do potrzeb i preferencji konsumentów. Pomimo wielu zalet neuroobrazowania, należałoby jednak zwrócić większą uwagę na kwestie etyczne prowadzonych badań i komercyjnego wykorzystania wyników badań.

Introduction

Contemporary neuroscience is an interdisciplinary field of study which focuses on the biological underpinnings of human behavior in the context of neural networks and the central nervous systems. Neuroscience combines knowledge from various fields of science, including medicine, biology, biophysics, biochemistry, psychology, and information technology (Squire *et al.*, 2013, p. 3-15). The complex reality of the modern world and the close links between economic, social, and technological phenomena require a holistic approach to research on human behavior. Research into adaptive mechanisms, social functioning, and resource-limited decision-making is conducted in social and economic sciences. Due to the rapid development of the global market, new approaches are needed study the forces of supply and demand, consumer preferences, and products. Innovative approaches are required in both business and science.

Neuroeconomics is a relatively new and dynamically developing branch of economics that combines methods and theories from economics, psychology, and neurophysiology. Neuroeconomic research focuses on decision-making under risk and uncertainty, delayed reinforcement, ethics in economic decision-making, and the economic decisions made by individuals (consumers) and groups (consumer groups, societies) (Kenning & Linzmajer, 2011, p. 111; Noga, 2017, p. 102). The main aim of neuroeconomic research is to propose a unified scientific theory to explain the behavior of market actors (Camerer, 2006, p. 416-419). In turn, the purpose of neuromarketing studies is to evaluate the practical relevance of neuroscience research for business and management (Stach & Popek, 2013, p. 49). This interdisciplinary field of study combines multiple academic disciplines, including management, psychology, philosophy, and neurobiology, to identify the neural mechanisms that underly management decisions and promote the development of management competences (Wollenweber, 2016; 2021). Neuroimaging studies provide information about teamwork mechanisms that can be used by managers to improve productivity, offer effective solutions to problems, prevent conflict, develop and harness the potential of human resources, and build a goal-oriented culture in an organization.

This article is a theoretical discussion on the applicability of modern neuroimaging methods for neuroeconomics and neuromanagement. The aim of the study was to describe the specificity of fMRI and EEG as the two most popular neuroimaging methods in economics and management, and to determine their theoretical and practical relevance. The following research questions were formulated: 1) Which modern brain imaging (neuroimaging) methods are applied in neuromarketing?, and 2) What are the practical implications of neuroimaging methods for economics and management? A literature review was conducted with the use of Google Scholar (<http://scholar.google.com/>) and ResearchGate (<https://www.researchgate.net/>) web search engines based on the following keywords: neuromarketing literature review, EEG, and fMRI. Databases were selected based on the list proposed by A. Booth *et al.* (2016, p. 113) and the arguments made by E. Orduna-Malea *et al.* (2017).

Neuroeconomics and neuromarketing are multidisciplinary fields that seek to explain the affective, cognitive, behavioral, and social components of economic decision-making based on neural activity in the human brain. Interdisciplinary research teams composed of economists, managers, and psychologists observe human behavior and build models to explain consumer decisions, whereas neurobiologists apply the appropriate research tools to explain biological mechanisms underpinning economic decision-making (Glimcher & Rustichini, 2004, p. 447-452). Non-invasive imaging methods, mainly fMRI and EEG, are used in neuroeconomics and neuromanagement to analyze brain activity during decision-making under controlled conditions (Glimcher *et al.*, 2009). Increasingly sophisticated and innovative methods for analyzing the bioelectrical activity of the brain are being developed, and the results have both theoretical and practical

implications for economics and management research, which suggests that fMRI and EEG can significantly expand our knowledge about consumer behavior and contribute to the development of neuroeconomics and neuromanagement.

Literature Review

In recent years, neuroimaging methods have been increasingly used in economics and marketing research. The literature reviews and bibliometric analyses conducted by P. Duque-Hurtado *et al.* (2020); N. Nilashi *et al.* (2020); R. Sharma and A. Sinha (2020); F.S. Rawnaque *et al.* (2020); L. Robaina-Calderín and J.D. Martín-Santana (2021); A.H. Alsharif *et al.* (2021); A. Byrne *et al.* (2022); T. Asunakutl and T. Aydoğan (2022); A.H. Alsharif *et al.* (2023); G.V. Jayavardhan and N. Rajan (2023); G. Srivastava and S. Bag (2023); P. Tirandazi *et al.* (2023), revealed that numerous imaging methods and tools are being applied in research. According to A.H. Alsharif *et al.* (2021), the largest number of neuromarketing research papers have been published in the USA, Spain, Italy, the United Kingdom, and Germany, which suggests that these countries are the key contributors to neuroimaging research (Alsharif *et al.*, 2021, p. 6). A steady increase was also observed in the number of research articles relating to neuromarketing research, which can be generally divided into two groups: theoretical studies and experimental studies (Duque-Hurtado *et al.*, 2020, p. 530). In recent years, most scientists have focused on the strengths and weaknesses of neuromarketing research (Cherubino *et al.*, 2019; Songsamoe *et al.*, 2019), consumer involvement (Lim *et al.*, 2021), and behavioral control (Lim & Weissmann, 2023). A.H. Alsharif *et al.* (2021) reviewed 106 articles and found that brain activity was monitored with both electrical and metabolic methods such as electroencephalography (EEG) functional magnetic resonance imaging (fMRI), and functional near-infrared spectroscopy (fNIRS), whereas physiological activity was controlled during positron emission tomography (PET), galvanic skin response (GSR), and electrocardiogram (ECG) tests (Alsharif *et al.*, 2023, p. 6).

Most consumer behaviors and purchasing decisions are unconscious or subconscious processes that take place in deep brain structures, which is why neural correlates of brain processes play a very important role in marketing and management research. According to W.M. Lim (2018), EEG and fMRI are the most popular neuroimaging methods in marketing research, followed by ECG, ET, GSR, and EMG. A recent review revealed that EEG was the most widely used neuroimaging method in the marketing mix (in 37 (35%) of the reviewed articles), followed by fMIR (in 25 (24%) of the reviewed articles) (Alsharif *et al.*, 2023, p. 7, 8). According to M. Nilashi *et al.* (2020), a combination of three neurophysiological imaging techniques, i.e. EEG, MEG and fMRI, is increasing

applied in marketing research. The cited authors found that neuroimaging methods are most widely used in business (23.39%), psychology (14%), and neurological sciences (11%) (Nilashi *et al.*, 2020, p. 25, 28).

The neuromarketing approach focuses on biological and neurophysiological process that affect consumer decision-making. R. Sharma and A. Sinha (2020, p. 14668, 14669) identified the existing research gaps where neuromarketing methods could be applied to analyze decision-making and consumer behavior, including in the field of cognitive psychology, psychological factors, and external and internal reflexes in social and biological categories of variables. Research has demonstrated that neuromarketing methods and neuroinformation systems can be applied to identify consumer emotions during decision-making and build effective marketing strategies (Rajab & Sharma, 2017). The emotions that accompany consumer choices and preferences are difficult to capture in traditional questionnaire surveys. The main purpose of neuroimaging is to expand our understanding of the neural correlates of emotions, attention, perception, memory, and decision-making (Alvino, 2019). Electroencephalography, fMRI, and fNIR provide accurate and reliable measurements of neural responses to specific marketing stimuli (Turel & Bechara, 2021). Therefore, neuroimaging methods can fill in research gaps relating to the affective, cognitive, and behavioral aspects of consumer decision-making.

Neuroimaging Methods in Neuroeconomics and Neuromanagement

In knowledge-based economies characterized by rapid technological change, sophisticated research methods are increasingly used to analyze market phenomena and consumer behavior, and to determine the influence of various types of information (stimuli) on consumer decision-making. In this context, neuroeconomics research focuses on changes in brain activity elicited by decision-making and external stimuli.

Innovative magnetic resonance imaging (MRI) techniques are used in modern neuroimaging to obtain information about brain morphology and activity during decision-making (Modo & Bulte, 2011). The most advanced MRI methods include magnetic resonance spectroscopy (MRS) which visualizes cerebral energy metabolism (Zhu & Barker, 2011, p. 203-226), and functional MRI (fMRI) which measures changes in brain activity (Huettel *et al.*, 2013). Diffusion-weighted imaging (DWI) is also a popular technique that generates specific brain maps (Thijs *et al.*, 2001, p. 1205-1211), including economic maps of the brain. Diffusion Tensor Imaging (DTI) analyzes diffusion anisotropy in the central nervous system and provides quantitative information about nervous tissue in the brain (Basser

et al., 2000, p. 625-632). Functional near-infrared spectroscopy is also applied in research (Vecchiato & Babiloni, 2011; Cakir *et al.*, 2018; Krampe *et al.*, 2018).

Other neuroimaging methods in neuroeconomics and neuromanagement research include positron emission tomography (PET) (Isabella *et al.*, 2015; Ramsoy, 2015), magnetoencephalography (MEG) (Ramsoy, 2015), electroencephalography (EEG) (Skriabin *et al.*, 2021), event-related potentials (ERP), and intracellular and extracellular action potentials of a single neuron (Nilashi *et al.*, 2020, p. 24; Jayavardhan & Rajan, 2023, p. 141-143). Responses to specific stimuli can be also evaluated based on the results of blood, urine, and cerebrospinal fluid tests, and responses to intravenously administered drugs. Four types of methods are most frequently used in neuromarketing research: neuroimaging (direct measurement of brain activity), biometric techniques (measurement of brain activity elicited by new, significant, or motivating stimuli; heart rate and respiratory rate measurements; analysis of posture and facial expression), oculography (measurements of eye movement), and psychometric methods (measurement of response times which reflect hidden and unconscious associations and attitudes).

Functional MRI is a non-invasive assessment of brain activity, and it has the greatest theoretical and practical significance in economic research (Alvino *et al.*, 2020). Functional MRI combines conventional MRI with measurements of blood flow in the brain (Parizel *et al.*, 2011), and it detects hemodynamic changes in capillaries. Local blood flow is strongly correlated with the activity of central nervous system tissue (Boz *et al.*, 2017). Brain activity is monitored based on changes in oxygenated and deoxygenated hemoglobin observed in the magnetic field. Active brain regions (regions that are activated during consumer decision-making) require more oxygen and accumulate more oxygenated hemoglobin. Brain activity is measured based on changes in the strength of the MRI signal from active and less active regions of the brain (Ogawa *et al.*, 1990). Blood-oxygen-level-dependent (BOLD-contrast) imaging is an fMRI method that monitors brain activity based on changes in blood oxygenation. Decision-making processes are evaluated and economic and non-economic determinants of consumer decisions are identified by measuring the rate and volume of blood flow in the brain and the resulting activation of nervous tissue.

Electroencephalography is also a useful neuroimaging technique in economic research. This non-invasive diagnostic method is applied to measure the bioelectrical activity of the brain and the action potential of the central nervous system (Cherubino *et al.*, 2019). During an EEG exam, electrodes are placed on the scalp and voltage fluctuations between electrodes are measured (Rawnaque *et al.*, 2020). The signal is amplified, and an electrogram of the spontaneous electrical activity of the brain during decision-making is recorded (Byrne *et al.*, 2022, p. 2). The results are interpreted based on the frequency and amplitude of brain waves. H. Berger was the first scientist to measure human brainwaves (1929). The main types of brain waves are alpha waves (8-12 Hz; 30-100 $\mu\text{V/m}$),

beta waves (12-30 Hz; >30 mcV/m), gamma waves (25-100 Hz), theta waves (3,5-8 Hz), and delta waves (1-3 Hz). Each frequency band corresponds to different mental states. A knowledge of brain waves is needed to assess consumers' and decision-makers' responses and perceptions of various stimuli (Aditya & Sarno, 2018; Rawnaque *et al.*, 2020, p. 15).

In an era of rapid technological and social change, the decisions made by consumers and producers constitute an important topic of research and drive business strategies, which spurs the search for innovative, accurate and reliable research methods. The syncretism of economics and medicine is thus unavoidable.

Theoretical and Practical Relevance of Neuroimaging

Decision-making scenarios and marketing stimuli can significantly affect the human physiology, influence the decision-making process, determine purchasing decisions, or elicit specific behaviors in a team. Neuroimaging techniques that measure the signals generated by tissues and organs, and the generated images of tissue and organ structure are valuable tools in research on consumer behavior (Hamzehei *et al.*, 2011, p. 139-148). Bodily responses to specific economic and marketing stimuli provide a wide range of valuable information. An interdisciplinary approach to analyses of the decision-making process and the attitudes and behavior of market actors increases the explanatory power of economic and management sciences (Polowczyk, 2010, p. 497). Neuroeconomics research explores the neuromicroeconomic aspects of market behavior in individuals, as well as the neuromacroeconomic aspects of market behavior in groups (Noga, 2017, p. 106). Research on human functioning and decision-making is conducted in a strictly economic context, as well as in the general social context (Karim *et al.*, 2019). According to C.F. Camerer and G. Loewenstein (2004), economic models represent a simplified reality based on strictly rational principles, and they will be replaced by behavioral models over time. D. Kahneman and V. Smith received the Nobel Prize in economics for their pioneering research in behavioral economics and decision-making, which will pave the way to the broad implementation of this interdisciplinary approach. In studies examining consumer behavior, the information acquired with the use of medical diagnostic tools will provide answers only about biological responses to marketing stimuli (Kenning & Linzmayer, 2011, p. 111). The extent to which these findings can be applied in business practice is strictly determined by the researchers' ability to interpret diagnostic results in the economic and marketing context (Ariely & Berns, 2010, p. 131).

The results obtained with the use of neuroimaging tools, in particular fMRI and EEG, have broad practical relevance for neurofinance, neuromarketing, and neuromanagement.

The aim of neurofinance research is to identify the key determinants of investment decisions and to explore the biological mechanisms underpinning investor behavior (Glimcher & Rustichini, 2004, p. 447-452). Utility is a central concept in financial research. C. Frydman *et al.* (2021) tested the utility of investor behavior by measuring brain activity with the use of fMRI. This pioneering study demonstrated that neuroeconomics offers valuable tools for testing mathematical and economic models. Neuroimaging assessments provide strong evidence for the realization utility theory. The cited study confirmed that neural activity in the ventromedial prefrontal cortex (vmPFC), an area in the brain that is critical for reward and value-based decision-making, was positively correlated with profit or loss in a financial transaction. Profit realization increased the activation of the ventral striatum (vSt) which is implicated in reward processing, whereas loss realization decreased vSt activity. An fMRI examination revealed that subjects with a strong vmPFC signal were more likely to realize capital gains, whereas a significant correlation was not observed between VmPFC activation and loss realization. Neuroimaging revealed the presence of a positive correlation between vSt activity and profit realization (Frydman *et al.*, 2012). The results of fMRI assessments confirmed that investors derive utility from realizing gains in market transactions.

Functional MRI was also used to map reward and punishment processing in the human brain and its impact on investment decision-making (Yarkoni *et al.*, 2011, p. 665-670). The cited study confirmed the dual-system hypothesis and the functional lateralization of responses to gain and risk (areas activated in the left hemisphere: SN/VTA, vmPFC, ventral striatum; areas activated in the right hemisphere: dorsal striatum, anterior insula, dmPFC/ACC, amygdala). The activity of the right hemisphere increased in response to a capital gain, whereas the activity of the left hemisphere increased in response to loss. In turn, cash payments activated the prefrontal cortex which is a part of the brain's reward system (Rorden *et al.*, 2007, p. 1081-1088). These observations imply that the brain perceives money as a valuable object or a source of pleasure which activates older receptors in the reinforcement system (Smith, 2013). The motives and mechanisms underlying investment decisions were also investigated in neurofinance research. Functional MRI assessments revealed that the anterior insula was responsible for risk aversion. In turn, risky investment decisions led to the activation of the nucleus accumbens which processes and reinforces reward stimuli (Maciejasz-Świątkiewicz & Musiał, 2014).

The applicability of neuroimaging was also tested in neurobanking to determine the motives and strategies of individuals and institutions in the banking and finance sector, to identify factors that influence decision-making in the banking sector, and to classify the gains and risks associated with banking and financial transactions (Flejterski, 2008, p. 532).

Neuroimaging tools are increasingly used in neuromanagement research which integrates knowledge from applied psychology, behavioral economics,

and neurophysiology. Neuroscience research focuses on team management, business strategies, sales, and communications (Dai, 2019; Karim *et al.*, 2019; Titov & Pluzhnik, 2020; Wollenweber, 2021; Asunakutlu & Aydoğan, 2022). Neuromanagement studies test image and authority building techniques in organizations, personal development and employee support models, and methods for managing human resources, projects, change, conflict, and negotiations. Neuromanagement consists of several subdisciplines that are based on the behavioral approach, including neuromarketing, neuroleadership, and neuropsychology in management. According to research, employee recognition, professional development opportunities, and a friendly workplace environment are the key motivational factors that boost productivity (Spitzer, 2012, p. 137). Neuroleadership combines the results of neuroscience research with business practice, mainly in the context of leadership, change management, consulting, and coaching. W. Dai (2019) defined neuromanagement as a neural mechanism of multimodal interactions. S. Titov and E. Pluzhnik (2020) observed that in an era of rapid scientific progress and the emergence of neurosciences, management had to be redefined, and its key variables had to be analyzed from a different perspective. An interdisciplinary concept was needed to explain decision-making processes, leadership practices, change management, innovation, creativity, productivity, employee engagement, and emotions. T. Asunakutlu and T. Aydoğan (2022, p. 428-444) described the practical implications of neuromanagement in a biometric analysis of neuroscience research in management and organization.

In neuromarketing, fMRI and EEG are not only useful tools for theoretical research, but they are also increasingly applied for commercial purposes. The results of neuroimaging assessments are used to develop pricing strategies and plan marketing campaigns. In neuromarketing, medical diagnostic tools and the knowledge of human behavior are applied to optimize marketing messages. In turn, neurobranding is an innovative approach to developing strategies and marketing techniques based on neuroimaging data with the aim of assessing consumer responses and identifying marketing stimuli that trigger the desired responses. The applicability of EEG in marketing has been recognized by numerous researchers, including G. Vecchiato *et al.* (2009, p. 57-60; 2010, p. 165-179; 2011); T. Nyoni and W.G. Bonga (2017, p. 30-38); A. Byrne *et al.* (2022); J. Siddique *et al.* (2022). The potential of EEG in marketing research was also discussed by H. Mruk and M. Sznajder (2008); G. Zaltman (2008); M. Lindstrom (2009); L. Zurawicki (2010); R. Ohme *et al.* (2011), A.K. Pradeep (2011). The applicability of EEG in neuromarketing was examined by G. Vecchiato *et al.* (2010, p. 165-179) who monitored changes in the brain activity of subjects watching commercial, political, and public service announcements on television. Television commercials that were remembered and regarded as pleasant increased the heart rate and brain activity, mainly in the theta band in the left hemisphere. Changes in brain activity were monitored with the use of EEG which proved to be a highly accurate tool for determining which parts

of an advertisement elicited emotional reactions and which triggered cognitive processing. The study demonstrated that the engagement of orbitofrontal circuits varied over time in subjects watching standard commercial spots and emotional spots (non-profit companies) (Babiloni *et al.*, 2006, p. 3676-3679). High-resolution EEG was also used to monitor brain activity in subjects watching a documentary interrupted by commercials and to compare cortical areas that were engaged by the commercial and the documentary. A review of the literature and business practices indicates that EEG is a useful tool in neuromarketing research because it identifies the connections between brain hemispheres and determines the bioelectrical activity of the brain in response to various triggers. Alpha activity registered in the left hemisphere (frontal lobe) is indicative of positive emotions, friendly responses, and subjective preferences, but alpha activity in the right frontal lobe is associated with the opposite emotions. These emotions exert a significant influence on purchasing decisions.

Montague *et al.* (2004) recreated the Pepsi Challenge campaign with the use of fMRI to examine subjective consumer preferences for Coca-Cola and Pepsi. Functional MRI is a useful tool for analyzing the involvement of different brain regions in subjective value coding and individual preferences that influence perceptions of value and decision-making (Clithero & Smith, 2009, p. 11).

According to T. Nyoni and W.G. Bonga (2017, p. 30-38), the results of neuromanagement and neuromarketing studies enable businesses to optimize product branding before launch, monitor consumer responses, increase brand recognition, boost advertising effectiveness, increase revenues through market segmentation, increase customer satisfaction and loyalty, implement optimal marketing strategies to achieve business goals and maximize profits, and create a friendly organizational culture that promotes management. However, despite the benefits of neuroimaging, the ethical aspects of neuromarketing research and the use of neuroimaging data for commercial purposes stir controversy.

Similarly to other neuroimaging methods, EEG and fMRI have considerable diagnostic value, but they are not free of drawbacks such as artifacts that can affect the quality of the obtained images. Three types of artifacts originating from different sources can be identified in EEG examinations. The first type of artifacts are external artefacts that arise outside of the patient's body, including electrode signals, disruptions during signal reinforcement, conversion of analog signals to digital signals, and other equipment-related artifacts. Artifacts belonging to the second type are generated across the boundary of the internal and external environment, and they are associated with changes in electrode impedance, high frequency oscillations, electrode displacement, cerebral blood flow, respiration, ballistocardiography artifacts, bioelectrical skin reactivity, and the reference electrode. The third type of artifacts are caused by internal (physiological) processes that accompany the natural bioelectrical activity of the body, including artifacts associated with muscle activity, eye movement, blinking, and tongue movement.

The quality of measuring equipment and the MRI scanner plays an important role in neuroimaging. The most accurate results are generated by scanners with high spatial, contrast, and temporal resolution. Temporal resolution of several milliseconds is required to monitor changes in brain activity associated with the processing of visual and acoustic stimuli in television commercials. Despite its advantages, MRI is relatively the most expensive neuroimaging technique due to the high cost of MRI scanners and other monitoring devices. Brain scanning, data collection, and image analysis are also time-consuming processes, and MRI scanners have to be operated by highly qualified medical personnel. As a result, neuroimaging studies involving MRI are difficult to conduct on a large scale. The use of fMRI for research purposes requires considerable funding, and such studies are performed only in highly specialized, interdisciplinary research centers.

In conclusion, neuroimaging techniques such as fMRI and EEG can fill in the knowledge gap in conventional psychological and behavioral research. Neuromarketing studies often combine fMRI and EEG to generate accurate and reliable results. According to neuroscience research, the following brain regions play a key role in thought and decision-making processes: ventral striatum (reward), nucleus accumbens (pleasure), orbitofrontal cortex (reward-based decision-making), medial prefrontal cortex (positive emotions and bond strengthening), prefrontal cortex (self-regulation), and the insula (risk processing). Neuroimaging provides reliable data for empirical research and promotes the development of realistic economic models.

Discussion

The present study accentuates the need for an interdisciplinary approach in modern economic research that fuses insights from medical diagnostic methods. The applicability of EEG and fMRI in economic and management research was described. However, the study has certain limitations because it merely outlines the discussed problems. Systematic reviews of neuromarketing studies are available in the recent literature (2023-2020). The present study lays the groundwork for a systematic review of studies in the field of neuromanagement, which can be followed by empirical research involving EEG and fMRI (the authors are medical professionals who are qualified to provide diagnostic imaging, electrodiagnostic, and radiation therapy services). The existing research focuses mainly on commercial marketing, and in the future, the applicability of EEG and fMRI should be also examined in the context of social marketing. Social marketing is a process of planning, implementing, and controlling programs to influence behavior and resolve social problems. Such studies would have important theoretical and practical implications. Individual and social attitudes towards

consumption are evolving in an era of rapid socioeconomic change. The COVID-19 pandemic has led to changes in individual and social values, and it can be hypothesized that psychological factors will play an increasingly important role in consumer behavior, and that personality traits largely determine consumer support for cause-related marketing, ethical marketing, and green marketing.

Objective neuroimaging methods, including EEG and fMRI, contribute to cognitive realism and enable researchers to accurately describe and predict market phenomena and purchasing decisions. On hypercompetitive markets, modern neuroimaging techniques can increase the effectiveness of business and marketing strategies, improve customers' perceptions of promotional and advertising activities, enhance the attractiveness of products and services, improve brand image, and optimize product prices. The wide range of diagnostic methods for monitoring brain activity and the advancements in neuroradiology clearly indicate that MRI and EEG will play an increasingly important role in research (Siwek, 2015, p. 17-20). The rapid development of artificial intelligence and biometric solutions will also contribute to the popularity of neuroimaging techniques in both research and business.

Despite the above, rigorous standards should be introduced to ensure that the use of modern neuroimaging methods in research does not violate ethical principles. Moral issues and ethical guidelines should be observed in both neuroscience research and commercial applications that rely on neuroimaging tools. A review of the literature indicates that most experimental studies highlight the advantages of neuroimaging, but disregard the ethical and axiological aspects of the applied research methods. Therefore, potential ethical risks associated with neuroimaging should be analyzed because the commercialization of neuroimaging data and information about consumer behavior can violate individual rights. A code of ethics for neuromarketing research was proposed by E.R. Murphy *et al.* (2008). Neuroethics is thus a critical consideration in contemporary neuroscience and consumer neuroscience. Neuroeconomics and neuromanagement are interdisciplinary fields with considerable research and development potential. However, in an era of dynamic scientific progress, the ethical boundaries of neuroimaging should be clearly defined, and the axiological foundations of contemporary neuromarketing and neuromanagement should be described.

Conclusions

Brain activity determines the ways in which information is received, processed, stored, and memorized. Research studies analyzing the structure, physiology, properties, and functions of the human brain and its regions contribute valuable information about biological mechanisms underpinning decision-making

and economic choices. The current study relies on the assumption that the empirical research in neuroscience can promote the development of economics and management as scientifically rigorous fields. The syncretism of medicine (neurology and radiotherapy), psychology (cognitive-behavioral), and economics (experimental and behavioral) implies that neuroimaging will have a growing number of theoretical and practical implications. Neuroimaging will also contribute to the implementation of optimal, practical and innovative solutions in business practice. A better understanding of affective and cognitive processes in the human brain plays a special role in research on individual and group decision-making and consumer behavior.

Neuroimaging is particularly useful for developing economic maps of the brain which present the activity of various brain regions in economic decision-making. Dynamic social and technological processes in the market environment increasingly often catalyze changes in business strategies. Innovative and objective research methods play a significant role in research on affective, cognitive, and behavioral attitudes of market actors, which also promotes the evolution of research methodologies.

Neuroimaging tools are objective because fMRI and EEG register direct responses of the central nervous systems that cannot be controlled or manipulated by the tested subject, which has significant theoretical and practical implications. Functional MRI and EEG scans can be used to model economic and managerial decision-making. Economics, management, psychology, and neuroscience search for the mechanisms underlying human behavior and the determinants of the decision-making process. Neuroimaging tools provide accurate information about neural and bioelectrical activity and support brain mapping. A robust knowledge of the determinants of economic and managerial decision-making contributes to the development of behavioral theories, and it enables scientists to predict future events. Neuroimaging can be used to validate the existing consumer behavior theories. In the future, neuroimaging could also be implemented in social marketing.

In conclusion, modern neuroeconomics and neuromanagement supported by advanced brain imaging tools set the theoretical framework for research into the potential of the human brain and the rationality of purchasing decisions. At present, neuroimaging is used mainly in the fields of neurofinance, neurobanking, neuromarketing, neuroleadership, and neuromanagement. Neuroimaging results contribute to the implementation of innovative solutions in business practice.

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DETERMINING THE DEGREE OF FISCAL DOMINANCE AND ITS IMPLICATION ON THE CONDUCT OF MONETARY POLICY IN NIGERIA

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Key words: fiscal policy, monetary policy, fiscal dominance.

Abstract

This study determines the degree of fiscal dominance and its implication on the conduct of monetary policy in Nigeria. It adopts the Dynamic Ordinary Least Square (DOLS) estimation techniques and covers the periods of 1980 to 2020. The regression result shows an estimated coefficient of 0.77, which indicate a high degree of fiscal dominance in the country. In the same vein, the estimated coefficient was compared with the average value of the consumer price index and interest rate in the economy, and it was discovered that high degree of fiscal dominance corresponds with high consumer price index and interest rate in the economy. Flowing from the findings, it is concluded that there is high degree of fiscal dominance in Nigeria, and this has implication on the conduct of monetary policies in the country. The degree of fiscal dominance in the country is likely one of the factors responsible for high prices in the country. It was recommended that The Nigerian government should focus on widening the domestic revenue mobilization base of the country. This would include expanding the tax base, setting up appropriate mechanism to generate more revenue from fines, fees and licenses, providing a conducive environment for remittances inflow into the country. The Central bank should limit their finances of government expenditure to 10 percent of previous year's revenue as suggested by the World Bank. They should limit their borrowings to capital project, such that such project can boast aggregate supply and normalize average prices in the economy.

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STOPIEŃ DOMINACJI FISKALNEJ I JEJ WPŁYW NA PROWADZENIE POLITYKI PIENIĘŻNEJ W NIGERII

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Słowa kluczowe: polityka fiskalna, polityka monetarna, dominacja fiskalna.

Abstrakt

W badaniu określono stopień dominacji fiskalnej i jej wpływ na prowadzenie polityki pieniężnej w Nigerii. Przyjęto technikę estymacji metodą dynamicznych, zwykłych, najmniejszych kwadratów (DOLS). Badaniami objęto okres od 1980 roku do 2020 roku. Współczynnik regresji przyjął wartość 0,77, co wskazuje na wysoki stopień dominacji fiskalnej w kraju. W tym samym duchu porównano oszacowany współczynnik ze średnią wartością wskaźnika cen towarów i usług konsumpcyjnych oraz stopą procentową w gospodarce i stwierdzono, że wysokiemu stopniowi dominacji fiskalnej odpowiada wysoki wskaźnik cen towarów i usług konsumpcyjnych oraz stopa procentowa w gospodarce. Na podstawie uzyskanych wyników można stwierdzić, że w Nigerii występuje wysoki stopień dominacji fiskalnej, co ma wpływ na prowadzenie polityki pieniężnej w tym kraju. Stopień dominacji fiskalnej w kraju jest prawdopodobnie jednym z czynników odpowiedzialnych za wysokie ceny. Zaleca się, aby rząd Nigerii skupił się na zwiększaniu dochodów krajowych. Obejmowałoby to rozszerzanie bazy podatkowej, stworzenie odpowiedniego mechanizmu generowania większych dochodów z grzywnien, opłat i licencji, stworzenie sprzyjających warunków dla napływu przekazów pieniężnych do kraju. Bank centralny Nigerii powinien ograniczyć finansowanie wydatków rządowych do 10% dochodów z poprzedniego roku, zgodnie z sugestią Banku Światowego. Powinien ograniczyć swoje pożyczki do projektów kapitałowych, tak aby mógł osiągnąć odpowiednią podaż pieniądza i unormować średnie ceny w gospodarce.

Introduction

In an attempt to achieve macroeconomic objectives, government of nations adopts certain policy measures. Notably among them are monetary and fiscal policies. They include the manipulation of monetary instrument and government finances to move the nation in the desired direction. This desired direction embraces price stability, full employment of resources, economic growth and development, among others. In recent times, the relationship between monetary and fiscal policy has been increasingly discussed in macroeconomic literature, (especially after the financial crisis of 2008/2009 and the recent COVID pandemic of 2020 that force governments of nations to bail out the economy from deleterious effects of these phenomenon) (Fahr & Frank, 2010; Arby & Hanif, 2010; Belke

& Dreger, 2011) and possible connection between them have been established. The interdependence between them ranges from zero to one (De Resande, 2007), where zero denotes the presence of fiscal dominance and one monetary dominance.

Conventionally, fiscal authority is assumed to govern government budget, while monetary authority independently determines the nominal money supply and regulate for price movement in the economy (Barro, 1987; Sims, 1994; Creel & Le Bihan, 2006). In this scenario, the monetary authority establishes the price level while fiscal policy facilitates that bond are supported by tax revenue (Sargent & Wallace, 1981). This would guarantee the effectiveness of monetary policy such that there will be no connection between fiscal deficit and monetary growth, and subsequently price level.

However, if the fiscal authority does not adjust taxes nor expenditure to movement in the outstanding debt and the monetary authority has to back fully all the government debt, we have a case of fiscal dominance (Sanusi & Akinlo, 2016; Favero & Monacelli, 2003). Fiscal dominance is a situation where fiscal policy is active and monetary policy is inactive (Sims, 1994). That is, when fiscal authority becomes absolutely irresponsible to monetary policy, a situation where the Central Bank of Nigeria (CBN) print out more money to finance government expenses. This is likely indicated by a positive correlation of fiscal deficit with increasing money growth (Tanner & Ramos, 2002; Us, 2008). Jalil *et al.* (2013) argued that a positive long-run inflationary impact can be attributed to fiscal dominance which could have a deleterious effect on the economy. The presence of fiscal dominance makes it difficult for the implementation of monetary policy. Blanchard (2004) contends that if a high debt country decided to increase real interest rate to ameliorate inflation, the success of this act is contingent on whether or not the increase in interest rate raises the likelihood of debt default.

Although, literature have established the interdependency between fiscal and monetary policy to range from zero to one, in reality, these interdependencies do not assume the value of zero and one, as the monetary authority does not fully back all government debt and can only be subjected to a fraction of it. Also, the monetary authority cannot stay clear in absoluteness of government finances. In fact, the first Central banks were created explicitly to meet fiscal need (e.g., Riksbank in 1668, Bank of England in 1694) (see Hooley *et al.*, 2021). Bardo & Siklos (2018) assert that most of the Central banks found in the nineteenth century, were fiscally motivated, often for financing war. It was however, also found that many hyperinflation episodes are associated with Central bank financing of government debt (case are found in Hungary (1945–1946, Greece (1941–1945), Latin America in the 1980s, in Sub-Sahara Africa we had cases in Angola (1994–1997), Democratic Republic of Congo (1998), Zimbabwe (2007–2008; 2019–2020).

With the above, fiscal dominance is prevalent in every economy; it is the extent of fiscal dominance that determines the effectiveness and efficiency of monetary policy. Also, while Jalil *et al.* (2013) argued that a positive long-run inflationary

impact can be attributed to fiscal dominance, a number of empirical investigations have suggested otherwise (see Ornellas & Portugal, 2011) on Brazilian economy. This study would also ascertain the degree of fiscal dominance and its implication on average prices in Nigeria.

The Nigeria economy, alongside with rising budget deficit is rising inflation. Although, Tanner & Ramos (2002) claim this to be an evidence of fiscal dominance, empirical findings in recent times have produced somewhat mixed results. While some claim that rising prices have been reported in low fiscal dominance country (Ornellas & Portugal, 2011), some claim that fiscal dominance is associated with rising average prices in the economy (Jalil *et al.*, 2013). These mixed results could be as a result of focusing on the presence of fiscal dominance in an economy, instead of measuring the degree of fiscal dominance. A low fiscal dominance might be harmless to the economy, while countries with high degree might be in the danger of price instability.

While most literature have tried to establish the existence of fiscal dominance in a country or not, the paper seeks to investigate the degree of fiscal dominance in Nigeria and its implication on averages prices in the economy, because in reality, the monetary authority cannot stay clear in absoluteness the political demands of the government, hence, the interdependence between monetary policy and fiscal policy cannot be zero or one. It is the degree of fiscal dominance that determines the effectiveness of the monetary authority in its objectives of price stability.

This paper is divided into five (5) sections. The first section deal with the introduction to the study, the second section handles the literature review, the third section captures the data collection and methodological issues, the fourth section presents the result of the study and their interpretations, while the fifth section summarizes the findings of the studies with policy recommendations.

Literature Review

The Keynesian Theory of Fiscal Policy

Consequent to the great depression of the 1930s, Keynes (1936), in an attempt to unravel the cause of the great depression identified deficiency in aggregate demand as responsible for the great economic downturn, and therefore advocates government intervention as against the classical doctrine of free market. He suggested government could embark on deficit budget to stimulate the low level of output that characterizes the economic downturn. In other word, Keynes admonished actives fiscal policy, relative to monetary policy, claiming there are so many slacks in the economy to absorb the expansionary fiscal measure, without necessarily resulting in inflation. He claimed inflation in an economy are caused by structural factors rather than increase in money supply. Since Keynes advocated for this policy, scholars in the field have had mixed results in their

investigations. Scholar like Romer & Bernstein (2009); Elmendorf & Forman (2018) advocate for government action as countercyclical fiscal policy. In their findings, fiscal policy plays a significant role in adjusting for macroeconomic imbalances. There are however others who believed that fiscal policy must be restricted to have its main countercyclical impact only through automatic stabilizer (Taylor, 2002; Kraay & Serven, 2008; Cogan *et al.*, 2009; Taylor, 2009). Cogan *et al.* (2009) contend that the results obtained by Romer and Bernstein were affected by the assumption under the old Keynesian framework which exclude rational expectations that they adopted. They further argued that the results could be different under the recent Keynesian model that accommodates rational expectations by individual firms and some form of price rigidities. Beetsma (2008) had earlier discovered that the magnitude of fiscal policy on macroeconomic variables differs based on the how the model is constructed. A model with the assumption of closed economy produces a somewhat different result from that of an open economy and the set of fiscal policy instrument adopted matters. Kraay & Serven (2008) found fiscal responses to economic crisis to rarely succeed and could generate pervasive effect without strong institutions.

Monetary Theory

Owing to the great inflation of the 1960s, the monetary was spearheaded by Friedman (1963) who highlighted the danger in fiscal dominance and argued for monetary dominance as potent in achieving macroeconomic stability and other macroeconomic objectives. According to Friedman, “only money matters” and therefore, monetary policy is a more effective option in achieving macroeconomic objectives than fiscal policy. Supported by the quantity theory of money hypothesis, “inflation is always and everywhere a monetary phenomenon” and occur as a result of more rapid expansion in money supply than in output. Bernanke (2002) in explaining the implication of the quantity theory of money claim that a given change in the rate of money growth induces an equal change in average prices in the economy. The effectiveness of monetary policy has generated a lot of controversies, particularly after the financial crisis of 2009. Reinhart & Reinhart (2011) explained that two properties of macroeconomic models are especially germane to the deportment of monetary policy. First is that spending and pricing decisions are assumed to be based on long term assessments of real income and real rates of returns. The second is that, changes in monetary policy can change real interest rate only temporarily. Eventually, the forces of productivity and thrift determine them, not changes in nominal magnitude on the central bank balance sheet. Considering these two propositions, it suggests that the Federal Reserve’s interest rate policy, as long as it stays within the narrow range of experience, would not be expected to have a significant or long-lasting imprint on market or activities.

Taylor (2009) had earlier debunked explanations limiting the effectiveness of monetary policies due to the financial crisis of 2008. He presents that the Federal Reserve is held to have systematically run policy too loose from around 2002–2006, which encouraged the housing boom and the related financial market excesses. However, he noted that the deviation from tailored preferred policy were modest and such sensitivity of outcomes to those misses is hard to square with the proposition that the Fed can only keep the short-term real interest rate low for a limited time and that it is long term values that matter.

Empirical Literature

Empirical findings relating to the effect of fiscal dominance on the conduct of monetary policy have produced a somewhat different result. This could be because of the methodology or framework adopted, among other factors. Some of these findings are presented below. Sabate *et al.* (2005), in an attempt to find out of fiscal policy influence monetary policy in Spain, adopted the Vector autoregressive model. Sabate and his colleagues found that fiscal policy could interfere with strict monetary policy needed to control inflation and fix exchange rate as their investigation confirms the dominance of fiscal policy for the period. The budget deficit of the government of the nation exerts significantly positive effect on money supply, and spillover to price increase.

Hollmayr & Kulil (2018) on monetary – fiscal interaction and quantitative employed the dynamic stochastic general equilibrium model as a method of empirical investigation. Unlike Sabate and colleagues, the result of their investigation reveals that under fiscal dominance, and unconventional monetary policy has similar effects to conventional monetary policy on inflation because the wealth exercises downward pressure on price. Bajo-Rubio *et al.* (2009) present an inconclusive result on their investigation into deficit sustainability and inflation in the Economic and Monetary Union (EMU), adopting the fiscal theory of price as a framework. Their finds however show sustainability of fiscal policy in all EMU countries, other than Finland.

Sanusi & Akinlo (2016) investigated fiscal dominance in Nigeria for the period of 1986 to 2013. Mr Sanusi and Akinlo adopted the structural vector autoregressive model to examine the presence of fiscal dominance in Nigeria. Their analysis reveals that shocks to fiscal deficit of government does not stimulate responses from growth of monetary base and no causality was found running from fiscal deficit to growth in monetary base in the country. A somewhat different result was reported by Nachegea (2005) who conducted a similar study on Democratic republic of Congo. He however adopted a different methodology in multivariate cointegration analysis and vector error correction model (VECM). Nachegea recorded a strong and statistically significant relationship between government deficit financing and seigniorage, money supply also motivates

inflation in the country. Prior to Nachege's investigation, Chaudhary & Ahmad (1995) has reported a similar result on their investigation of money supply, deficit financing and inflation in Pakistan. They found that monetary policy may be handled by the monetary authority, but the fiscal decision if the government determines the overall formulation macroeconomic policies.

Van (2014) employed a high frequency data in monthly series to examine the effect of budget deficit on money supply and inflation in Vietnam between 1995 and 2012. Van found that budget deficit has no effect of money supply and inflation in Vietnam. Oladipupo & Akinbobola (2011) had conducted a similar study on Nigeria between 1959 and 2005 and found a result similar to that of Van.

Conceptual Framework

This study adopts the theoretical frame of Sabate *et al.* (2005) which claim that fiscal dominance begins with a perpetual and rising budget deficit. Budget deficit occurs when government estimated revenue is less than her proposed expenditure. Hence, the need for government to sources for finance to fill the lacuna between the estimated revenue and proposed expenditure. There two sources the government can explore. The first is the internal source that includes Central bank financing and the second is the external source that comprise of borrowings from multinational institutions. The linkages of fiscal dominance to monetary policy are presented schematically below (Fig. 1).

When government deficit is finance by creation by the Central bank, it increases the stock of money in circulation, and without corresponding increase in output, it results in rising prices, exchange rate devaluation, and low interest rate. These ultimately inhibit the ability of the Central bank to maintain stable prices in the economy.

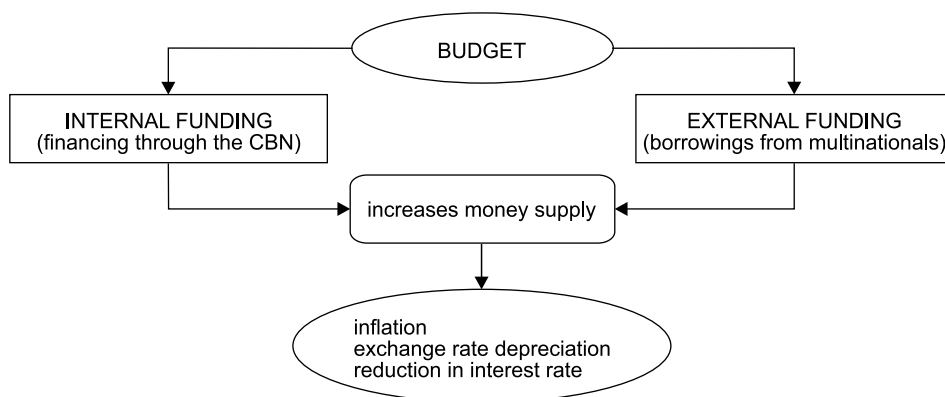


Fig. 1. Linkages of fiscal dominance to monetary policy

Source: own elaboration.

Data and Methodology

The study will adopt annual series from the Central Bank of Nigeria statistical bulletin (2019). The scope of the study will cover the periods of 1981 to 2020. The data to be adopted include money supply, budget deficit and prime lending rate (interest rate). Money supply here is the broad money supply (M2) which is the local currency in circulation, plus demand deposit, savings and fixed deposit. This measures the total volume of money in circulation as decided by the monetary authority. Budget deficit is the magnitude by which government proposed expenditure exceeds her total revenue. The essence of this study is to see the magnitude at which budget deficit derives money supply in the economy. The interest rate represents the lending rate. It measures the cost of capital. It is employed as a control variable as it constitutes one of the monetary policy instruments of the monetary authority. Exchange rate and consumer price index are also employed as prices in the model on which we measure the effect of fiscal dominance.

The study will adopt a dynamic Ordinary Least Square (DOLS) estimation technique because of its potential to accommodate both stationary and non-stationary series. Although the Ordinary least square is adjudged to be the best linear estimator as it produces minimum variance and an estimate closer to population mean, all assumption guiding this model must be satisfied for it to produce the best linear estimate. One of the important requirements is that the series in the model must be a level series, but in reality, most of these series exhibit non stationarity, and consequently render OLS inefficient. The DOLS adjusts for the weaknesses of OLS, as it improve the OLS by coping with small samples and the dynamic source of bias (Stock & Watson, 1993). It also has the advantage of providing a robust correction to the possible presence of endogeneity in the explanatory variables, as well as serial correlation in the error term of the OLS estimator (Bajo-Rubio *et al.*, 2009). This method however requires that the series be cointegrated. Hence, before the application of the method, pre-estimation tests like stationarity and cointegration test will be conducted.

The model for the study is to be specified as follow:

1. Objective one

$$\text{money supply} = f(\text{budget deficit, interest rate}) \quad (1)$$

This is reparametrized as follows:

$$\text{money supply} = a_0 + a_1 \text{ budget deficit}_t + a_2 \text{ interest rate}_t + \varepsilon_t \quad (2)$$

where:

a_0, a_1, a_2 – are the estimation parameters, but it is the magnitude of a_1 that measures the degree of fiscal dominance in the economy. This value is expected to range between 0 and 1. Any value close to 1 would signal high level of fiscal dominance in the economy.

2. Objective two

To achieve how degree of fiscal dominance affect average price level, the estimated parameter of α_1 will be measured against the average prices as inflation, and interest rate. This is because there no ready time series data to capture the degree of fiscal dominance, as the estimated α_1 captures the average level of fiscal dominance in the economy over the periods considered. Therefore, the estimated mean of inflation, and interest rate over the period will be compared with the estimated level of fiscal dominance. A single digit inflation and interest figure will denote moderate inflation and interest rate level. If the estimated parameter α_1 is less than 0.5 and we have a single digit inflation and interest rate, then low level of fiscal dominance corresponds with low prices. If on the other hand, the estimated α_1 is greater than 0.5 and correspond with single digit average prices, then high level of fiscal dominance does not affect average prices in the economy (Sanusi & Akinlo, 2016).

Results and Interpretations

The descriptive characteristics of the series in the model are presented in Table 1. It includes such descriptive statistics as: mean, median, standard deviation, skewness coefficient, kurtosis, median and others.

Table 1

Descriptive statistics of the series in the model

Statistics	MS2	PLR	BD1	CPI
Mean	6,230.7	22.1	630.8	19.1
Median	1,036.1	21.6	103.8	12.6
Maximum	29,137.8	36.1	4,913.8	72.8
Minimum	16.2	10	1	5.4
Std. Dev.	8,935.7	6.2	1,158.3	17.1
Skewness	1.3	-0.1	2.3	1.8
Kurtosis	3.2	2.7	7.8	5
Jarque-Bera	10.7	0.2	72.6	27.2
Probability	0	0.9	0	0

Source: computed from evIEWS 10.

Over the periods of 39 years, average money supply stood at N6,230 billion, which represent about 38,451 percent increase from 1981. Money supply in the economy has maintained a significantly continuous increase over the year. This would have implications on macroeconomic condition of the economy, like GDP, average prices among others. The maximum lending rate (MLR), which represents

the cost of capital in the economy, has an average figure of 22.1 percent. Compare to 1981 figure, the rate has increases by about 121 percent. The implication of increase in the cost of capital is that it increases the opportunity cost of holding capital in the economy. Real exchange rate recorded an average of N94.3 per dollar within the periods. From 1981, it has increased by about 15,359 percent, meaning that the value of naira to naira to dollar has reduced by about 15,359 percent. The average size of budget deficit with the period stood at N630.8 billion, which represent an average increase of 16,074 percent increase from the year 1981. This means that from 1981, government budget deficit has increase 160.7 times. The consumer price index recorded an average of 19.1 percent under the periods of study. This would mean that on the average, consumer prices increase by 19.1 percent. This implicates that real income of consumer equally reduces by 19.1 percent. Table 2 shows the stationarity properties of the series in the model.

Table 2

Unit root test

	ADF		PP		$I(d)$
	levels	first difference	levels	first difference	
LBD	-5.038***	-10.148***	-5.080***	-15.272***	$I(0)$
LM2	-0.898	-3.852**	-0.956	-3.783**	$I(1)$
LEXCH	-1.278	-5.608***	-1.267	-5.819***	$I(1)$

Source: computed from eviews 10.

This test allows us to ascertain the predictability or relative stability of the series in the model over a long time. The test reveals that the series are stationary in mixed order $I(0)$ and $I(1)$. $I(0)$ variable are stationary series whose movement are relatively predictable overtime, while $I(1)$ variables are non-stationary variables whose values are subject to periodic and relatively unpredictable movement. Budget deficit (LBD) appears to be stationary at levels, while money supply (LM2) and exchange rate (LEXCH) are stationary only after first differencing. Because the series are stationary at mixed level of integration, there is a need to ascertain whether or not long-run relationship exists among the variables. This relationship is established by conducting a cointegration test as presented in Table 3 below.

The essence of the test is to establish whether or not long-run relationship exist among the variables in the model. For cointegration to be established, the trace statistics and max-eigen statistics are expected to exceed the critical value at 5 percent significant level. The table above shows cointegration exists among the series in the model with both Trace and max-eigen statistics greater than the critical values at 5 percent significant level. The presence of cointegration in the model fulfills the condition for the use of Dynamic Ordinary Least Square estimator as presented in Table 4 below.

Table 3

Cointegration test using both trace statistics and Maximum Eigenvalue

Unrestricted cointegration rank test (trace)				
Hypothesized	—	trace	0.05	—
No. of CE(s)	eigenvalue	statistic	critical value	prob.**
None*	0.324	33.286	29.797	0.019
At most 1*	0.313	19.192	15.495	0.013
At most 2*	0.146	5.690	3.841	0.017
Unrestricted cointegration rank test (maximum eigenvalue)				
Hypothesized		max-eigen	0.05	
No. of CE(s)	eigenvalue	statistic	critical value	prob.**
None	0.324	14.094	21.132	0.357
At most 1	0.313	13.502	14.265	0.066
At most 2*	0.146	5.690	3.841	0.017

Source: computed from evIEWS 10.

Table 4

The regression result measuring the degree of fiscal dominance in Nigeria

Dependent variable: LOG(MS2)				
Method: dynamic least squares (DOLS)				
Variable	coefficient	std. error	t-statistic	prob.
LOG(BD)	0.772	0.304	2.537	0.017
EXCH	0.012	0.008	1.573	0.127
C	2.545	0.762	3.339	0.003
R-squared	0.931			
Adjusted R-squared	0.911			

Source: computed from evIEWS 10.

The relationship between government deficit financing and money is established to be positive and significant. From the result, a percentage increase in government budget deficit likely increases by about 0.77 percent. This would mean that for every N100 increase in budget deficit, money supply increases by about N77 in the Nigerian economy. From literature, the relationship between fiscal and monetary policy ranges between 0 and 1 (De Resande, 2007), with values close to 0 interpreting low degree of fiscal dominance, while values approaching 1 hint at high degree of fiscal dominance. With a coefficient of 0.77, approximately, close to unity, it implies that in the coordination of fiscal and monetary policy in Nigeria, the fiscal policy is more active. This is an indication of high degree of fiscal dominance in the country. The adjusted *R*-squares depicts about 91 percent of changes in money supply are explained by budget deficit and exchange rate.

Examining the Trend of Inflation and Interest Rate in Respect to Degree of Fiscal Dominance in Nigeria

Having estimated the degree of fiscal dominance in Nigeria, it is imperative to analysis its relationship with average prices in inflation and interest rate owing to conflicting arguments in literature. While Kydland & Prescett (1977), Barro & Gordan (1983) identified fiscal dominance to be highly correlated with high prices, empirical works in Bade & Parkin (1982), Alesina & Summers (1993) suggested the contrary, claiming fiscal dominance correlates with lower levels of inflation in their findings. Since 1980, the consumer price index has been relatively unstable and main an average of 19.1 percent (Fig. 2).

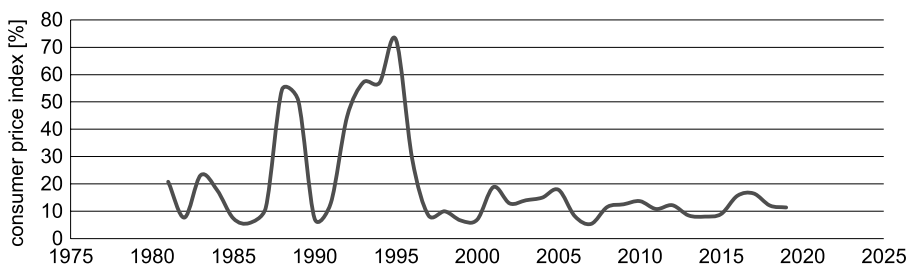


Fig. 2. Trends of consumer price index in Nigeria

Source: own elaboration.

Only in 1982, 1985, 1990, 1997, 1999, 2013, 2014 and 2015 did we record a single digit rate. This signals high level of inflation in the Nigerian economy. High inflation level signifies high reduction in the real income of consumer, which invariably increases the cost of living, and reduces the standard of living in the economy. Coincidentally, high inflation rate corresponds with periods of high degree of fiscal dominance in the country, with the degree of fiscal dominance of 0.77 on a scale of one, and average inflation rate of 19.1. Intuitively, high inflation rate in the country could be strongly associated with the inability of the CBN to effectively and efficiently pursue the objective of price stability as against financing government activities as shown in the estimated degree of 0.77 (Fig. 3).

Looking at the interest rate in Figure 3, it had an upward trend from 1980 to 1991 and thereafter maintains an average downward trend till date. Increase in interest rate signifies an increase in the cost of holding capital, and invariably discourages investment. On the average, Nigeria records an average interest rate of 22.1 percent within the periods of analysis. This rate is on the high side and also corresponds with periods of high degree of fiscal dominance in the country. This could mean that in an attempt to curb the rising average consumer price index occasioned by increase in money supply, the monetary authority increases the interest rate to contract the volume of money in the economy.

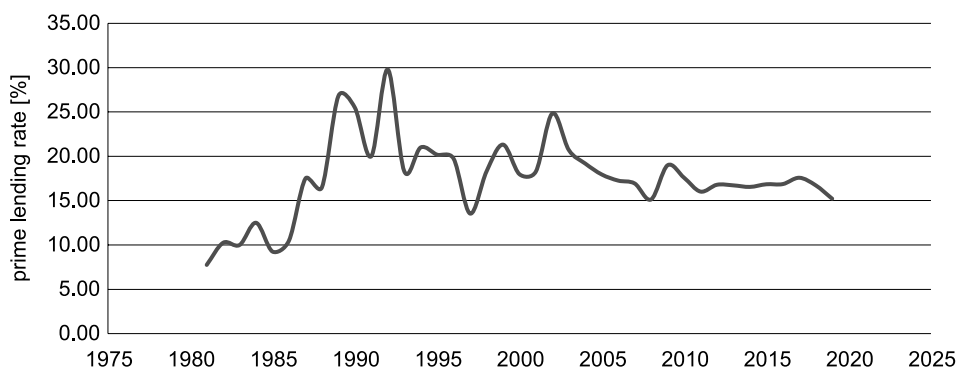


Fig. 3. Trends of prime lending rate in Nigeria

Source: own elaboration.

Summary, Conclusion and Recommendation

The study focuses on determining fiscal dominance and its implication on the conduct of monetary policy in Nigeria. The specific objectives are to determine the degree of fiscal dominance in the country and its implication on average prices. The scope of the study ranges from 1981 to 2020. The dynamic OLS estimation method was adopted after establishing cointegration among the series in the model. The regression result shows an estimated coefficient of 0.77, which indicates a high degree of fiscal dominance in the country. In the same vein, the estimated coefficient was compared with the average value of the consumer price index and interest rate in the economy, and it was discovered that a high degree of fiscal dominance corresponds with a high consumer price index and interest rate in the economy.

Flowing from the findings, it is concluded that there is a high degree of fiscal dominance in Nigeria and this has implication on the conduct of monetary policies in the country. The degree of fiscal dominance in the country is likely one of the factors responsible for high prices in Nigeria. From the conclusion from the study, the followings are recommended;

1. The Nigerian government should focus on widening the domestic revenue mobilization base of the country. This would include expanding the tax base, setting up appropriate mechanism to generate more revenue from fines, fees and licenses, providing a conducive environment for remittances inflow into the country.
2. The Central bank should limit their finances of government expenditure to 10 percent of previous year's revenue as suggested by the World Bank.
3. They should limit their borrowings to capital project, such that such project can boost aggregate supply and normalize average prices in the economy.

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