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EDITORIAL OFFICE: Department of Business Activity and Economic Policy, Poznań University of Economics and Business, al. Niepodległości 10 | 61-875 Poznań, Poland, Phone +48 61-856-95-56, Email: ref@ue.poznan.pl, www.ref.ue.poznan.pl

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ul. Powstańców Wielkopolskich 16, 61-895 Poznań, Poland
phone +48 61 854 31 54, +48 61 854 31 55 www.wydawnictwo.ue.poznan.pl, e-mail: wydawnictwo@ue.poznan.pl postal address: al. Niepodległości 10, 61-875 Poznań, Poland

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Preface

Dear Readers,
We are pleased to present the latest issue of the Research Papers in Economics and Finance published by the Poznan University of Economics and Business Press. We have selected six scientific papers that we consider important for the academic discussion, works which inspire and provide substantial added value.

This issue opens with an empirical paper written by **Eugenia Sozinova and Tetyana Oriekhova** from Vasyl' Stus Donetsk National University in Ukraine entitled *Evaluating the transnationalisation potential of the economies in the countries of South-Eastern Europe*. The work is an attempt at evaluating the potential for transnationalisation of the economies of South-Eastern Europe. The authors constructed an index to measure the phenomenon of transnationalisation. Using this approach, they proved that Albania is the leader in transnational business, while Bosnia and Herzegovina is an outsider.

The second great paper entitled *Significance of the EU funds in regional development on the example of NUTS-3 units in Poland* has been written by **Joanna Spychała and Marcin Spychała** from the Poznań University of Economics and Business. The authors conducted three-stage research at the level of 73 NUTS-3 units in Poland, proving that the European Union funds absorption impacted to the largest extent the changes in the level of innovativeness and entrepreneurship in the Polish subregions of the NUTS-3 level. Furthermore, the results of the EU fund absorption supporting innovativeness or the material capital are visible in a relatively short time period.

The third original and topical paper written by **Edyta Małecka-Ziembińska** from Poland is entitled *Fiscal transparency in recovery from the COVID-19 pandemic crisis.* The author proved that in the vast majority of countries around the world the condition of public finances has deteriorated significantly as a result of measures taken to reduce the effects of the COVID-19 pandemic. The author demonstrated that large-scale expenditure is made without public procurement procedures or an assessment of its effectiveness.

The fourth paper entitled *Housing conditions in social housing stock vs. marginalisation risk—evidence from Poland* has been written by **Zuzanna Rataj and Katarzyna Suszyńska** from Poland. In the study, the authors used questionnaire interviews with dwellers of council flats in Poland. The survey results showed that the standard of municipal housing in Poland is low and makes it difficult for low-income households to meet their housing needs. Small dwelling areas, overcrowding, as well as poor quality of construction materials have

been identified as important determinants increasing the risk of housing exclusion in municipal dwellings.

The fifth paper entitled *Young customers' expectations in terms of implementing PropTech (Property Technology) on the local primary residential market in Poland* has been written by **Anna Górska, Anna Mazurczak and Łukasz Strączkowski** from Poland. The authors used surveys targeting young people in the city of Poznań and proved that a large group of customers are aware of modern technologies, claiming that they would be willing to pay more for the technologies they choose. According to the authors' opinions, this number could be increased if the buyers were pointed to specific savings from investing in modern solutions.

The sixth paper entitled *Economic security of an industrial enterprise in competitive conditions* has been written by **Alona Revko** from Chernihiv Polytechnic National University and **Svitlana Tulchynska & Tetiana Tkachenko** from National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine. The study focuses on ensuring economic security of industrial enterprises in competitive conditions. The authors proved that economic security of an industrial enterprise is a multifaceted, multi-vector concept, according to which the main emphasis is put on the efficiency of all types of resources in the process of ensuring competitiveness of an industrial enterprise.

Piotr Lis
Editor-in-Chief

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Evaluating the transnationalisation potential of the economies in the countries of South-Eastern Europe

Eugenia I. Sozinova
Vasyl' Stus Donetsk National University, Ukraine
https://orcid.org/0000-0002-4325-6482; evsozinova@yahoo.com

Tetyana V. Oriekhova
Vasyl' Stus Donetsk National University, Ukraine
https://orcid.org/0000-0003-3650-5935; t.oriekhova@donnu.edu.ua

Abstract: The paper proposes a methodological approach to assessing the potential for transnationalisation of the countries in South-Eastern Europe. The paper presents an integrated indicator of the potential for transnationalisation, which is the average of five standardised variables that characterise the degree of resource potential for internationalisation in the form of transnational development trade, as well as the algorithm of application of these indicators in order to rank countries according to the degree of development and usage of their existing potential. Based on the use of this method, the countries of South-Eastern Europe were ranked according to the actual use of the potential for the transnationalisation of their economies. A comparison of the obtained values of the index of the transnationalisation potential of the countries in South-Eastern Europe with the actual data characterising international investment activity in these countries made it possible to build a matrix for the classification of the countries according to the availability and use of the transnationalisation potential. The analysis makes it possible to state that the level of the actual inflow of FDI to Montenegro is higher than the level of its potential for transnationalisation. The evidence of FDI inflows relative to GDP makes it possible to classify Albania as the leader in transnational business. Evidence of FDI inflows to Bosnia and Herzegovina confirms its characteristics of the transnationalisation potential as an "outsider" to transnationalisation. All other studied countries fell into the category of countries with underestimated investment potential in attracting foreign direct investment, i.e. the potential for transnationalisation (domestic).

Keywords: transnationalisation, countries of South-Eastern Europe, classification matrix, rating methodology, integrated indicator.

Introduction

The countries of South-Eastern Europe currently demonstrate varying degrees of integration into the European Union. Most of these countries began their

transformation into market relations in the early-1990s, from almost equal conditions of the current command-administrative system of economic regulation, similar in the structure, current form of ownership, as well as integration into the value chains in the socialist camp. The importance of assessing the potential of transnationalisation in the economies of South-Eastern European countries is conditioned by the need for appropriate policies to involve the national economies of these countries in the joint system of socio-economic development and quality of life, the possibility of benefiting from globalisation of the global economy.

1. Literature review

The concept of Central and Eastern Europe originated after the Treaty of Versailles, but the debate started gaining momentum after the extension of the EU in 2004. The key issue is the very meaning of the concept of "Central and Eastern Europe". Scholars see in it an intellectual construction and an object for research, a historical plane and space, a separate region with a common cultural and historical destiny. Particular attention was paid to the concept by Ukrainian researchers E. Mahda (2015; 2017), Y. Kahanov (2005), I. Piliaiev (2013), who analysed the criteria for distinguishing the region, identifying stages of transformation of the concept, suggesting methodological aspects of using the concept of Central and Eastern Europe.

The Geoscheme for Europe from the UN Bureau of Statistics identifies four regions, including Eastern, Western, Southern and Northern Europe. The countries that are broadly considered to belong to Central and Eastern Europe, have been divided by the UN into the following subregions: Northern Europe: Estonia, Latvia, Lithuania; Eastern Europe: Belarus, Bulgaria, Moldova, Poland, Russia, Romania, Slovakia, Hungary, Ukraine; Southern Europe: Albania, Bosnia and Herzegovina, Macedonia, Serbia, Slovenia, Croatia, Montenegro (United Nations).

The preamble to the "Geoscheme" explains that such a division is quite conditional and not universal. The selection is based on common historical experience and the criterion of homogeneity: climatic-geographical, demographic, confessional-linguistic features. For example, in the explanations of the UN Bureau of Statistics, Eastern Europe includes countries bordering Asia, more or less associated with the "Eastern bloc" of the Cold War and is dominated by Orthodoxy (United Nations).

Despite the large amount of research by both foreign and domestic scholars on global economic integration, the impact of regional economic integration and investment flows requires research based on the latest theoretical and methodological approaches and modern generalisation of economic dynamics, the impact of synergies on regional integration—Eastern Europe. The CIA's

directory of Eastern Europe includes the Baltic States and the Caucasus (CIA World Factbook).

In the period of post-communism of the late-20th and early-21st century, Central and Eastern Europe has made the transition to a liberal, socially-oriented economic model by copying the institutions of the market economy and Western democracy in Western Europe, especially Germany, in combination with "catch-up" integration. The region lagged behind Western structures, but today Central and Eastern Europe is a more dynamic region than the so-called "old" Europe. According to the classification of the report "World Economic Situation and Prospects (WESP)" for 2019, most CEE countries are in the group of developed countries (this subgroup in 2014 was tentatively called "new EU member states") (World Economic Situation and Prospects 2019. United Nations, 2019, 102–103). Albania, Serbia, Montenegro, Bosnia and Herzegovina, and Macedonia are described in the report as "transition economies" with above-average incomes and fall into the subgroup of "Southeast Europe" (World Economic Situation and Prospects 2019. United Nations, 2019, 114). In 15 years, the situation has changed significantly, as in 2004 the World Bank identified only Slovenia as an industrialised country, and all other countries in the region were classified as transition economies. At present, the average economic growth rate in Europe is 1.9% annually, but more positive prospects are forecast for Central and Eastern Europe at 3.7% GDP growth in 2019 (World Economic Situation and Prospects 2019. United Nations, 2019, 5).

Central and Eastern Europe is not an international actor, but the common difficulties of the transition period by the countries of the region encourage these countries to cooperate and develop a common approach, especially to foreign policy issues. A Hungarian researcher, A. Ágh, quite critically describes the place of the region of Central and Eastern Europe in modern international relations, which he fits into the "geopolitical crisis". A. Ágh (2016) emphasises a certain destructive role of the region with its characteristic processes of disintegration, deconsolidation and illiberal tendencies, corruption and populism. L. Kabada (2017) hopes that a constructive dialogue is possible through cooperation with all EU members, leadership in some issues and the mediation of "consolidated democracies" in Central and Eastern Europe, such as Slovenia and Estonia.

Despite the large number of scientific papers by both foreign and domestic scholars on global economic integration, the impact of regional economic integration and investment flows requires research based on the latest theoretical and methodological approaches and modern generalisation of economic dynamics, the impact of synergies on regional integration—Eastern Europe.

2. Methodology

The theoretical and methodological foundations of the study are the issues of international economic integration and the impact of synergies of regional economic groups on economic growth, development of European integration processes, the relationship between regional economic integration and foreign direct investment, which mainly reflect the investment attractiveness of BNC, as well as the formation of potential for transnationalisation of countries.

The aim of the study is to assess the potential for transnationalisation of the economies of South-Eastern Europe. Several methods have been used to conduct the study, including: the method of generalisation of the system, the method of induction and deduction, the method of comparative analysis, the graphical method, the method of analysis and synthesis, the methods of economic and mathematical modelling. The study uses data from leading international organisations—the World Bank, UNCTAD (The World in Europe, global FDI flows towards Europe Intra-European FDI Applied Research; World investment report, 2019).

In order to assess the potential of integration of South-Eastern Europe in the process of transnationalisation of the world economy in terms of transnational nature of their own business, the author developed an algorithm and indicators for assessing the potential and motivation of transnationalisation of the national economy.

The methodology for determining the potential for transnationalisation of the economies of South-Eastern European countries is based on the algorithm for assessing and implementing the potential for transnationalisation of the countries (Figure 1).

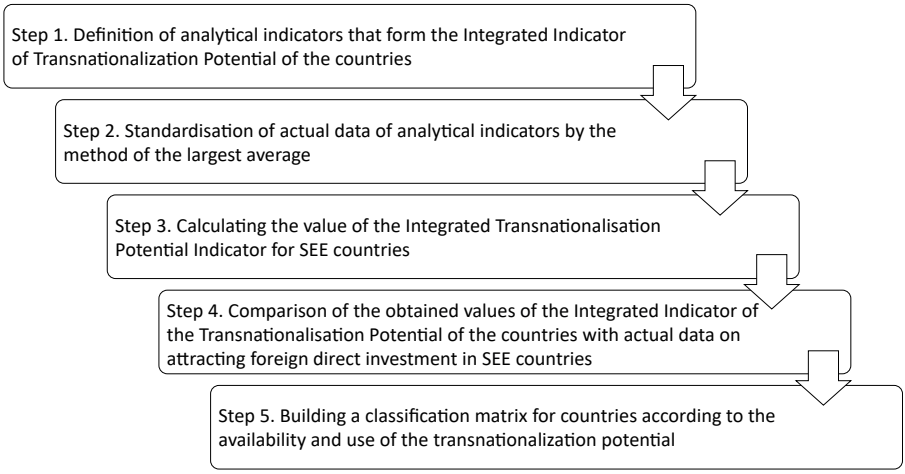

Figure 1. An algorithm for assessing and realising the potential of transnationalisation of countries

Source: Own work.

The constituent stages of this algorithm are the definition of analytical indicators, on the basis of which the integrated indicator of the transnationalisation potential of the countries will be calculated. First of all, these indicators characterise the degree of resource provision of transnational development potential, the size of the national market, the attractiveness of the country's financial sector and its stability, the level of the country's involvement in international labour division and international trade.

The next step is to standardise the actual data of analytical indicators by the method of the highest average. This is necessary to obtain results that will be in the range from 0 to 1, which simplifies the task of their interpretation. Next, the Integrated Indicator of the Transnationalisation Potential of Countries is calculated, which indicates the level of income through the indicator of the average GDP per capita for IPO; the state of the country's financial system through the average real interest rate; the country's participation in the international division of labour through the indicator of the share of exports of goods and services in the country's GDP; the state of labour use, the potential use of labour resources and the problem of the value added through the value of labour; the size of the national market through the country's population and income. The next step of the algorithm for assessing the potential for transnationalisation of countries is to compare the obtained values of the integrated indicator of the countries' potential for transnationalisation with the volume of foreign investment. Based on this analysis, the authors built a matrix of classification of countries by the level of availability and degree of use of the transnationalisation potential.

3. Results and discussion

The macroeconomic model for calculating the integrated indicator of the transnationalisation potential is proposed to be calculated as the average of five standardised variables for each country, which characterise the degree of resource provision of the transnational development potential, market size, financial sector attractiveness, level of trade internationalisation:

$$I_{ITPE} = \frac{\overline{GDP} + \overline{IR} + \overline{EV} + \overline{LC} + \overline{P}}{5}, \quad (1)$$

where

I_{ITPE} – An integrated indicator of the country's transnationalisation potential;

$\overline{GDP}$ – standardised average GDP per capita for PPP;

$\overline{IR}$ – standardised average real interest rate;

$\overline{EV}$ – standardised average share of exports of goods and services in the country's GDP;

$\overline{LC}$ – standardised average labour costs;
$\overline{P}$ – standardised average population of the country.

Standardisation of variables allows us to obtain results that will belong to the interval from 0 (minimum value) to 1 (maximum value), which simplifies the task of their interpretation.

The proposed algorithm for estimating and calculating the indicator of the potential for transnationalisation of industries has been used in the assessment of the relevant indicators of the countries in South-Eastern Europe. The results of the calculation are presented in Figure 2. Calculations were made for the new EU member states, candidate countries and the Eastern Partnership countries.

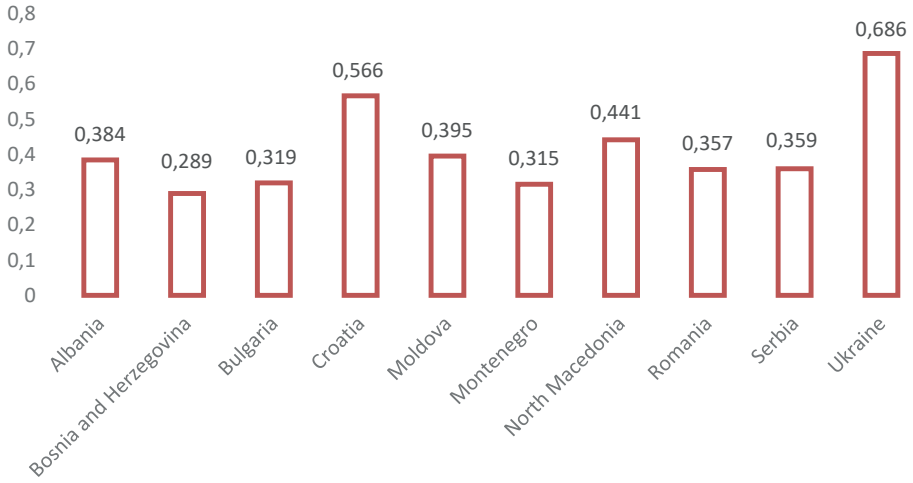

Figure 2. The results of the calculation of the integrated indicator of the potential for transnationalisation of the countries of South-Eastern Europe
Source: Own calculations.

Thus, the leading positions in the proposed indicator are taken by Ukraine and Croatia (0.686 and 0.566 USD, respectively), which is primarily due to Croatia's GDP per capita and the real interest rate, which reflects the real value of funds for the borrower and real profitability of the lender or investor; in Ukraine, the real interest rate and market size (standardised average population) also became the indicators that had the greatest impact on the Integrated Transnationalisation Potential.

A comparison of the obtained values of the index of the transnationalisation potential of South-Eastern Europe with the actual data characterising the international investment activity in these countries (Figure 3-4) makes it possible to build a matrix of classification of SEE countries by the availability and use of transnationalisation potential (Figure 5).

The matrix is a division of countries that have been evaluated into four quadrants: "Countries that have a transnational nature of business above the

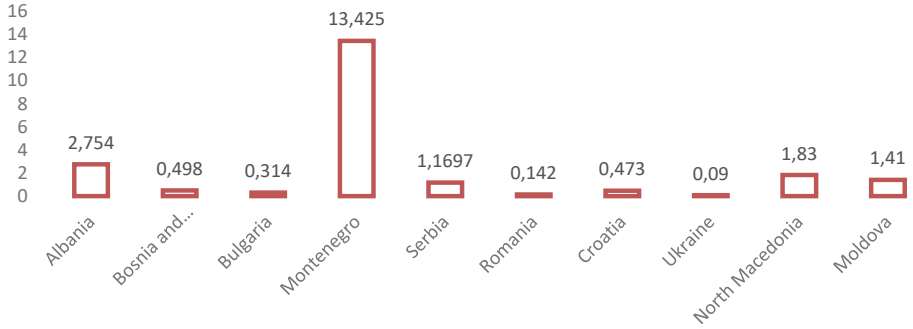

Figure 3. FDI per capita by SEE countries in 2019, million USD
Source: Own work.

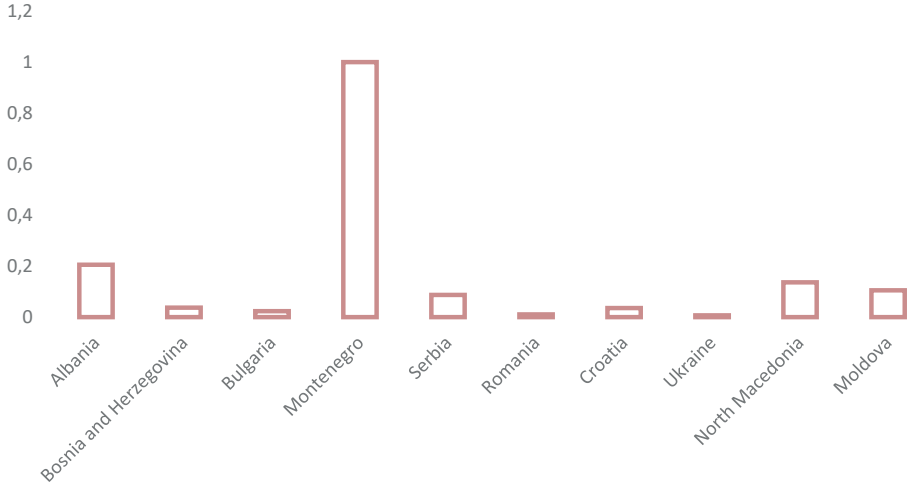

Figure 4. Standardised value of FDI per capita by the method of the highest average, 2019
Source: Own work.

level of potential", "Countries—leaders in the transnational nature of business", "Countries—'outsiders' of business transnationalisation", "Countries which have a transnationalisation of business, a lower level of potential.

Thus, the analysis makes it possible to state that the level of the actual inflow of FDI to Montenegro is higher than the level of its potential for transnationalisation. The evidence on FDI inflows relative to the GDP makes it possible to classify Albania as a leader in transnational business. The evidence of FDI inflows to Bosnia and Herzegovina confirms its characteristics of the transnationalisation potential as an 'outsider' of transnationalisation. All the other countries studied fell into the category of countries with underestimated the

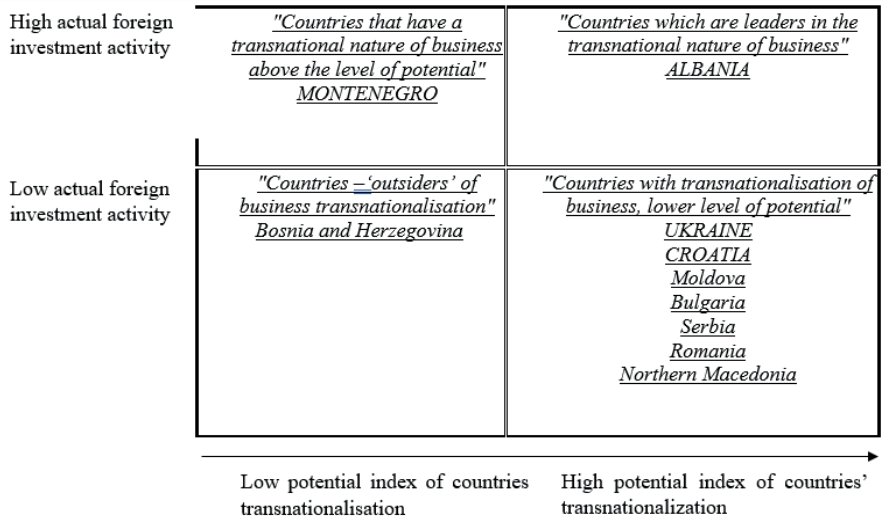

Figure 5. Matrix of classification of SEE countries by the availability and use of the transnationalisation potential
Source: Own work.

investment potential in attracting foreign direct investment, i.e. the potential for transnationalisation (domestic).

Important factors influencing the realisation of the potential of transnationalisation of countries are investment country risks.

Globalisation processes have limited the use of traditional risk assessment methods and the need to develop new ones. Today, the most well-known assessment methods are Moody's Investors Services, Euromoney, Business Environment Risk Intelligence (BERI), FitchIBCA, Credit Risk International, The Economist, Political Risk Services: International Country Risk Guide (IRCG), etc.

The specific nature of country risks has led to the need for systematic analysis of both macroeconomic data and the involvement of some subjective elements.

Modern research allows existing models of country risk assessment to be divided into several groups (approaches). Among them are the following:

The quantitative approach (PSSI; Ecological Approach; Political System Stability Index; Knudsen's Ecological Approach) to country risk assessment compares countries with varying degrees of risk using a single numerical risk indicator that summarises the relative impact of a number of socio-political factors across a set of political and social indicators. The main disadvantages of this approach are the use of a narrow definition of political risk, as well as the choice of factors and determining their weight. Another problem of quantitative assessment methods is the sectoral (project) orientation of most country

risks (for example, political instability can contribute to the development of some industries and cause damage to others).

Some of these reports use econometric data, but their main feature is the ranking of a significant number of countries according to a certain logic of analysis. The most well-known service today is BERI (Business Environment Risk Index). The ranking of countries by the risk level includes several stages: selection of variables (political stability, economic growth rate, inflation rate, nationalisation rate, etc.), determination of the weight of each variable (maximum weight has a political stability variable), Delphi processing using an expert scale, derivation of the total index, theoretically located in the range from 0 to 100 (minimum index means maximum risk, and vice versa). Using the BERI model (Business Environment Risk Index), the so-called BERI index is obtained 4 times a year, which is used for the current analysis of the economic and political situation in any country or region. It is determined by surveying 100 experts in economics, sociology, law and psychology. They answer 15 questions anonymously, which are evaluation criteria. Each of these questions has its maximum share in percentage with a total of 100 and is also evaluated in points, having 5 options - from 0 (unacceptable) to 4. The index is synthetic, i.e. includes 15 economic and humanitarian factors. The higher the number of points scored, the lower the country's risk level.

The country risk assessment by the Economist Intelligence Unit is conducted for 100 countries and is based on four components: political risk (22% in the overall assessment; consists of 11 indicators); economic policy risk (28%; 27 variables); economic and structural risk (27%; 28 variables) and liquidity risk (23%; 10 variables). The obtained numerical values of risk, located on the scale from 0 (lowest risk) to 100 (highest risk), are converted respectively into a letter scale: A-E.

Euromoney, in its model of assessing the level of country risk, uses assessments in 9 categories: economic data (25% of the assessment), political risk (25%), debt indicators (10%), outstanding or restructured debts (10%), credit rating (10%), access to bank finance (5%), access to short-term finance (5%), access to capital markets (5%), discount on forfaiting (5%). At the same time, the assessment of political risk is carried out on the basis of expert opinions on a scale from 0 (high risk) to 10 (low risk). The resulting country risk value varies from 0 (highest risk) to 100 (lowest). These numerical values are converted into 10 letter categories: from AAA to N / R.

The measurement of the level of credit risk (more than 135 countries), conducted by the Institutional Investor (II), is based on a survey of experts who identify and assess the most significant risk factors. The obtained estimates are weighed depending on the expert and average. The final rating is in the numerical range from 0 (very high probability of default) to 100 (lowest probability of default).

In assessing sovereign credit risk, Moody's Investor Service analyses both the political (6 indicators) and economic (7 indicators) situation in the coun-

try. The risk level assessments obtained during this process take an alphanumeric value on a 21-character scale: from AAA to C.

The rating methodology of Standart & Poor's Ratings Group (S&P) is based on the results of forecasting the ability to service debts, the probability of default. It includes an assessment of political risk (3 factors) as the country's willingness to pay on time and economic risk (5 factors) as the ability to pay off debt. Ranking of countries is based on a 3-letter rating system: from AAA to D.

Another method is to determine the level of risk of the country, which was developed by the Swiss Banking Corporation. According to it, the analysis is carried out in three stages. The first is the definition and collection of key indicators, their evaluation and current (operational) analysis. At the second stage the independent forecast is carried out, and by means of estimations of the results of the first stage the level of risk of the country for the concrete area, region, the state is defined. The last stage of the analysis is to determine the level of aggregate risk of the country and the level of creditworthiness of the country (region, district), its financial stability and business activity of its subjects.

Table 1. Ratings of SEE countries in 2020

Countries	S&P	Moody's	Fitch
Albania	B+	B1	
Bosnia and Herzegovina	B (positive)	B3	B (positive)
Bulgaria	BBB (positive)	Baa2 (positive)	BBB (positive)
Northern Macedonia	BB-		BB+
Croatia	BBB-	Ba2 (positive)	BBB-
Romania	BBB- (negative)	Baa3	BBB- (negative)
Serbia	BB+ (positive)	Ba3 (positive)	BB+
Moldova		B3	
Montenegro	B+	B1	
Ukraine	B	Caa1 (positive)	B (positive)

Source: (Credit Rating. URL: https://tradingeconomics.com/country-list/rating).

As shown by the data presented in Table 1, the most positive and stable are the ratings of Bulgaria, according to the estimates of the three leading rating agencies in the world—S&P, Moody's and Fitch.

Among the most important risk factors that may hinder the investment development of the economies of the SEE countries, and in particular Bulgaria, are the following:

– Political corruption;

– Inefficient public administration;
– Decrease in the inflow of foreign direct investment.

The negative effects of growing corruption on Bulgaria's economic recovery include the following:

– Bulgaria's European partners are losing trust. Bulgaria's doubts have already prompted the European Union to withhold development funds in a number of cases. The economic consequences of the funding delay are likely to become apparent only in the long run. However, Bulgaria missed the opportunity to attract additional resources during the crisis and improve its infrastructure.
– High levels of corruption could negatively affect the efforts of the new centre-right government to implement reforms aimed at stabilising the economy and improving the business environment.
– Corruption makes doing business more expensive in the country, harms free competition and strengthens the position of "unproductive entrepreneurs" over those who actually produce something. This will lead to deteriorating business conditions, especially for small and medium-sized enterprises. They should be the backbone of the economy and can play a leading role in the country's post-crisis recovery.

Another very important aspect of corruption in Bulgaria is vote bribery and election violations. Elections, especially local ones, were overshadowed by widespread election fraud. This often distorts the true will of the electorate and allows the system to manipulate people who pursue business interests. This trend leads to an extreme loss of voter confidence in the political system and seriously impairs the country's democratic image among its international partners. If the authorities fail to address this problem through legislative changes and tighter controls, the loss of confidence at home and abroad could have detrimental consequences for Bulgaria's democratic and economic development.

The risk of instability in the new minority government may also hamper Bulgaria's recovery. Such instability, of course, blocks the necessary reforms. The new cabinet has several policy options to accelerate the exit from the crisis, but they all need stable parliamentary support:

1) reforming key state-funded sectors, such as health care, education and the pension system, along with the tax system and public finances;
2) implementing measures to address concerns in the EU, such as the need for an independent judiciary to ensure the transparent use of EU funds, the fight against corruption and the cessation of huge conflicts of interest within the executive;
3) implementation of urgent anti-crisis measures to prevent the deterioration of the financial condition of Bulgaria and stimulate economic recovery.

The stable and ever-increasing flow of foreign investment in Bulgaria in previous years has been one of the main factors contributing to economic growth.

Bulgarian enterprises are still not independent, strong or developed enough to support the country's economy on its own, making it difficult to obtain foreign loans. The decline in direct investment, combined with the conclusion of investors already in Bulgaria, could seriously hamper the country's economic recovery.

It can be noted that less FDI goes to less developed regions and countries in Europe. This is especially characteristic of the countries of South-Eastern Europe, which receive much less investment than the countries of the European Union. At the same time, countries in the region need special initiatives to attract more foreign firms, expand existing foreign enterprises and increase the diffusion of innovation.

The strength of sectoral clusters and the concentration of FDI are particularly important for less developed countries and regions. The development and restructuring of the sectoral structure of the economy requires joint efforts on the part of public authorities and the involvement of large business structures, including international capital. Therefore, initiatives to improve institutional quality and ensure effective cooperation between different levels of government and international structures are particularly important for countries with smaller preferences.

Regions and countries that are allowed to use financial investment incentives under EU state aid rules are more likely to host non-European firms than countries where incentives are prohibited. Thus, the use of such inflammatory incentives can be one way forward for countries with a low presence of foreign firms to begin building the potential for transnationalisation.

At the same time, incentives for investors should be used selectively and coordinated with other initiatives on the basis of the approach to attracting FDI and regional growth. Whether or not benefits are used to renationalise the economy, it is important that they are adapted to the local context and that incentives do not discriminate against local firms.

The applied value of the offered estimation technique of economy transnationalisation of the South-Eastern Europe countries can be recommendations to increase efficiency of using the transnationalisation potential and carrying out the policy directed on:

- strengthening industry clusters around existing strengths, for example by using a smart specialisation platform to help develop and implement smart specialisation strategies;
- improving the integration of foreign companies into regional value chains;
- improving access to neighbouring markets, for example, by investing in infrastructure that improves the region's connection with more developed regions;
- use of FDI to create jobs;
- integration of foreign firms into the local economy to optimise knowledge diffusion. A framework for cooperation between different national economic actors can foster innovation and expand regional value chains. In addition,

events that bring together people from different sectors and different types of business can facilitate the exchange of knowledge and the introduction of new technologies, products and services. This will be especially beneficial for SMEs;
- support of existing and creation of new foreign firms
- ensuring maximum FDI benefits for the country and building a strong national "brand";

M&A accounts for more than 70% of total FDI inflows to Europe. M&A has a direct positive impact on economic development in European countries, so it is important that foreign firms grow and continue to maintain jobs after the start.

European diversity, where countries have different territorial features, capabilities and needs, requires going beyond the "one size fits all" strategy to attract FDI. The combination of an attractive investment climate created by the EU, national and regional policies and the application of unique "best practice" strategies in line with the territorial context has stimulated FDI inflows to successful countries. It is important to emphasise that it is the countries that need to put these elements into context and add relevant aspects of FDI promotion that are specific to the country.

The basic approach to attracting FDI is in line with the Smart Specialisation approach introduced by the European Commission for the regions. In trying to replicate the success of other countries, policymakers must carefully consider existing territorial factors and the specific strengths and weaknesses of countries. The value of attracting foreign direct investment from intra-European and non-European BNCs is what effects they create for local firms and enterprises.

Thus, the first element of the approach to promoting FDI and using the potential of transnationalisation of the economy of the countries of South-Eastern Europe is the analysis of the economic structure, comparative advantages, as well as drivers of growth and constraints in the country. The purpose of the analysis is to identify the needs that will vary from country to country. Job creation may be a key need in one country, while in another—the growth of skilled labour restrictions. Capital can limit the growth of private firms in one country, while the lack of entrepreneurship limits the number of firms in another. Such an analysis can be used to develop a strategy for national and regional development with features that can stimulate the economic development of countries and regions. Therefore, it is important that the regional development strategy is based on and consistent with national strategies.

Another element of assessing and exploiting the potential of transnationalisation is optimising the benefits of FDI inflows by using synergies between the region's needs and the opportunities inherent in FDI inflows into the region. Synergies from stakeholder involvement in policy development can make countries more attractive to existing foreign companies for further expansion, and thus support even more jobs and improve the quality of life.

Conclusions

Mechanisms to stimulate the development of the potential for transnationalisation in South-Eastern Europe should include synergies from strengthening competitive advantages at the national and regional levels, as well as FDI incentive policies: restrictions in the country that can be used to develop a strategy for national and regional development with features that can stimulate the economic development of countries and regions; the second element is mapping the attractiveness of the country's regions for FDI. Understanding FDI drivers in different sectors, types of FDI and territorial contexts makes it easier for policymakers to develop highly emotional FDI promotion initiatives, and a comparison of regions on these FDI drivers will help achieve the potential; the third element of the mechanism is the optimisation of the benefits of FDI inflows by using synergies between the needs of the region and the opportunities inherent in FDI inflows into the region. Synergies from stakeholder involvement in policy development can make countries more attractive to existing foreign companies for further expansion, and thus support even more jobs.

The comparative analysis of the index of the transnationalisation potential of the SEE countries calculated according to the author's method and the available actual inflow of FDI per capita makes it possible to state that the level of the actual inflow of FDI to Montenegro is higher than the level of its transnationalisation potential. The evidence of FDI inflows relative to GDP makes it possible to classify Albania as a leader in transnational business. The evidence of FDI inflows to Bosnia and Herzegovina confirms its characteristics of the transnationalisation potential as an "outsider" of transnationalisation. All other surveyed countries fell into the category of countries with underestimated investment potential in attracting foreign direct investment, i.e. the potential for transnationalisation (domestic).

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Significance of the EU funds in regional development on the example of NUTS-3 units in Poland

Joanna Spychała
Poznań University of Economics and Business, Poland
https://orcid.org/0000-0002-0706-4205; joanna.spychala@ue.poznan.pl

Marcin Spychała
Poznań University of Economics and Business, Poland
https://orcid.org/0000-0002-3860-303X; marcin.spychala@ue.poznan.pl

Abstract: Within the EU cohesion policy, better and worse developed regions are subcategorised, taking account of the GDP value per capita. Based on that, areas qualifying for obtaining support from aid programs from the EU budget are established. The purpose of the article is an attempt at specifying the co-dependencies between the EU fund absorption and the changes in the level of the socio-economic development in the regional dimension. The research was conducted at the level of 73 NUTS-3 units in Poland in three stages. At the first one, the level of the development of the subregions in Poland is exhibited, subcategorising the factors of that development: human capital, material capital, natural environment as well as entrepreneurship and innovativeness. At the second stage, variation in the EU fund absorption in the researched units is presented. At the third stage, interdependencies between the extent of the absorption and the changes in the level of development within the arrangement of the factors of that development are taken up.

Keywords: EU funds, socio-economic development, synthetic measure.

Introduction

The basic financial instruments of the EU cohesion policy are the Structural Funds as well as the Cohesion Fund, both of which are often termed as "the EU funds" in the subject literature as well as in the economic practice. The main assumption of spending the EU funds is achieving economic, social and territorial cohesion, above all, through supporting development as well as creating new workplaces in the weakest developed states and regions (Nistor & Glodeanu, 2014). In relation to the abovementioned, mainly regions at the NUTS II level are qualified for financial support, i.e. regions whose GDP per capita in the case of Structural Funds is lower than 75% of the whole EU aver-

age. In the case of the Cohesion Fund it concerns the states with GDP per capita amounting to less than 90% of the average for the whole European Union, which had a program directed at meeting the economic convergence criteria (Beugelsdijk et al., 2018).

The means from the general budget of the EU were to contribute to the increase in the regional dynamism, thanks to which there were high hopes linked with that, not infrequently ascribing them the role of the *capo di tutti capi*[1] of the socio-economic changes of the EU regions, especially in its poorer part, i.e. Central-Eastern Europe. The first empirical research conducted suggested that their influence on the economy will be significant[2] (Florida, 2002). Further compilations have revealed, however, that the impact of the EU funds on the increase in GDP is significantly lower than it was originally expected[3] (Shikverdiev et al., 2019).

In light of the abovementioned, the portrayal of the significance of the EU absorption on the socio-economic development has become the basis for taking up the research subject matter at hand. The purpose of the article is an attempt at stating the correlations between the variation in structural fund absorption and the Cohesion Fund in Poland and the changes in the socio-economic level in the regional dimension. The level of regional development was specified within the dimension of the factors of development, subcategorising: the human capital, material capital, natural environment as well as innovativeness and entrepreneurship (treated as a whole). In the article, the notion of "absorption" is understood as an amount of funds actually spent in projects co-funded from the EU funds, realised within the EU cohesion policy in Poland, and used interchangeably with the notions of "commitment" and "use". In the research, projects co-funded from the EU funds realised within the years 2007-2017 were taken into account. The change in the level of the development was established for the years 2010-2019. Certain time displacement of the results of the EU projects on economic development was taken into account. The authors of other research most often indicate a two- or three-year delay in the impact of the EU funds on the economy (Grosse, 2018). In the article, a hypothesis has been verified, according to which the EU fund absorption to the largest extent impacted the development of innovativeness and entrepreneurship.

The research procedure was conducted in three stages. In the first one, the level of the socio-economic development in Poland in the subregional dimension was specified—at the level of the NUTS-3 units. For that purpose, an original synthetic gauge of the level of the development based on the data from

[1] From Italian: a person highest in the ranking, the most significant factor, boss of all bosses.

[2] For example, the first analyses using the HERMIN and MaMoR3 models conducted by the Institute of Research on the Market Economy as well as the Wrocław Agency of the Regional Development indicated that the EU funds shall impact the GDP level to as high an extent as 11.2%.

[3] Most often it was indicated that the EU funds impacted the GDP level at around 2.5%.

the Local Data Bank at the Main Statistical Office was used. The research was conducted at the level of subregions, on one hand for the purpose of achieving the greatest possible detail, and on the other—with respect to the accessibility of empirical data.

At the second stage, spatial variation in the EU fund absorption in the NUTS-3 units in Poland is presented, taking advantage of the data from the teleinformatic systems of the Ministry of Funds and the Regional Policy. At the third stage, interdependencies between the extent of the absorption and the changes in the level of development within the arrangement of the factors of that development based on the analysis of regression are stated.

1. Review of subject literature in the area of regional development

In the article, a review of the concepts of regional development shall be conducted in terms of the factors of that development, taking account of two main trends of the economic thought: the neoclassical and neo-Keynesian economics.

The concept of regional development of the neoclassical trend is, among others, the concept of convergence compiled by a Nobel Prize laureate Jan Tinbergen. The concept is in a direct relation with the theory of comparative cost, according to which the trade exchange between better and worse developed countries may with time lead to a decrease in the differences in their level of development, and even rendering equal the level of income in both those groups. Apart from the international exchange, other factors of development in that concept are also capital and technological progress (Illeris, 1993).

As opposed to the neoclassical concepts, in the first part of the twentieth century there appeared theories relating to John Maynard Keynes' doctrine. Prior concepts focused on the supply aspect, while Keynes and his followers focused on the demand analysis. The theories demand different administrative activities, directed at creating factors of development, such as: investment in infrastructure, promoting exports, increasing workforce qualifications, supporting the development of entrepreneurship or creating innovativeness (compare with: Florida, 2002).

The significance of innovativeness in the process of regional development was emphasised by Joseph Schumpeter—a representative of the Austrian school. In his opinion, development resembles the process of creative destruction (Emami-Langroodi, 2018). Innovation ensures change and development on one hand, and on the other—it destroys prior economic and social structures. Not all entities are prepared for such changes. Sometimes they are forced to self-destruct and introduce new technological solutions. Otherwise, they stop being economically competitive.

A new theory of development initiated by Paul Romer assumes the possibility of accumulating the factors of development, which equals the possibility of obtaining durable development, as well as maintaining economic differences between regions. The main factors generating development in this theory are: human capital and physical capital, as well as technological innovativeness. Poor regions may not make up for the developmental differences in a manner different than by improving their technological level as well as by investing in human qualifications (Arranz et al., 2019).

Against the background of the neoclassical trend, a contemporary model of the so-called economic geography emerges, which links three elements: the agglomeration costs, transport costs and the cost of means of production flows (compare with: Krugman, 1998; Eshugova, 2018). The model assumes the possibility of occurring, and even deepening, the interregional differences, which according to Grosse, is a result of the tendency to accumulate the factors of development in the most developed metropolitan regions, similar to Johann Heinrich von Thünen's theory of location (Grosse, 2018).

The regional policy is related to the occurrence of variations in the level of development of the respective regions. Discrepancies in regional development, resulting from investors' decisions, the underpinnings of the market mechanism or geographical factors, lead to variation in the level of income, as well as the conditions of life of the population. The main task of the regional policy is thus the necessity of limiting the scale of those variations (compare with: Fongwa & Marais, 2016).

2. Variation in the level of development of the NUTS-3 units in Poland in the years 2010-2019

Variation in the level of socio-economic development is a natural phenomenon, which results from uneven access to the means of production, such as: capital, labour or natural resources (Khasanova et al., 2020). The differences in the potential of regions are convergent with the majority of the theories of regional development (Yun et al., 2017). However, theories stemming from different scientific orientations explain variation in economic processes in a different manner. The first group of theories, stemming from the neoliberal trend, assumes minimising state interventionism, and the free market is treated as a regulatory mechanism (Krugman 1998). The second group of theories, representing the neo-Keynesian economic thought, considers interventionism to be an indispensable regulatory mechanism of regional development (Grosse 2018).

In order to state the variation in the level of the socio-economic development of the NUTS-3 units in Poland, a synthetic gauge of distance from the role model was used. The research procedure consisted of four subsequent steps: selection of variables, reduction of multi-feature space, indicating the level of

the socio-economic development as well as classification of all 73 NUTS-3 units on the scale of regional development.

In the first part of the research, a matrix of geographical information was created based on 60 indicators, which specified the level of development of the NUTS-3 units in the years 2010-2019 in reference to: the human capital (17 variables), material capital (18), natural environment (10) as well as innovativeness and entrepreneurship (15) (taken as a whole). The hereinabove mentioned factors of the development were identified based on the accessible review of literature. Next, Pearson's correlation coefficients between the indicators researched were calculated for their change in 2010-2019. The indicators selected for a synthetic gauge should thus be weakly correlated between each other, in order for their information capacity to vary (Balcerzak, 2016). The correlation coefficient matrices constructed constituted the basis for conducting the departure variable reduction using Z. Hellwig's method (i.e. separating those indicators which shall be considered in further procedure). The procedure of variable reduction was conducted fivefold: separately for the general level of socio-economic development and separately for the level of development of each of the four capitals being factors of that development.

At the next step of the research, a pattern and an antipattern of development were established, and subsequently, a taxonomic distance of each subregion researched from the assumed pattern of development was established (Yun et al.,

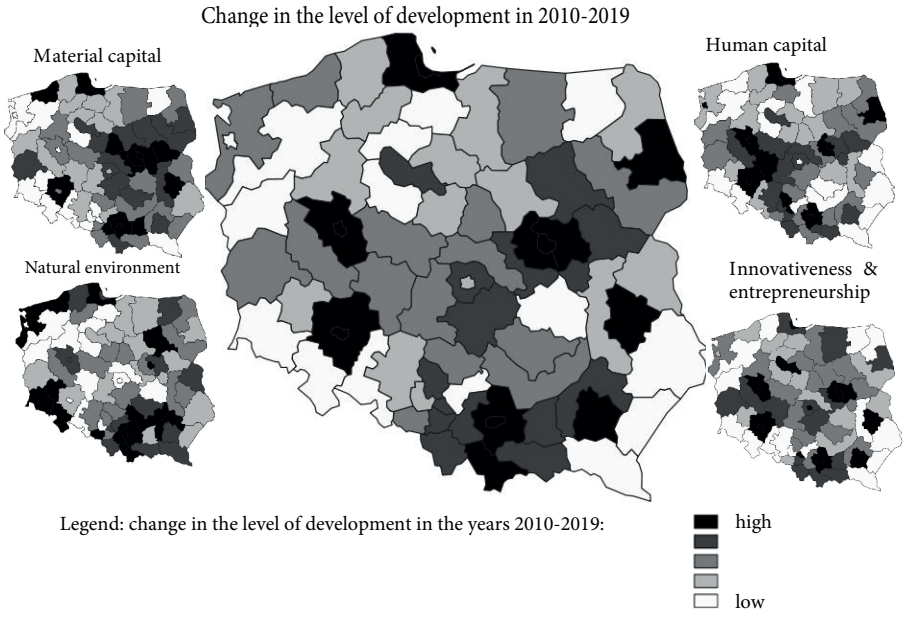

Figure 1. Spatial variation of socio-economic development and its aspects in Poland within the arrangement of provinces
Source: Own compilation based on the research conducted.

2017). In the last part of the research conducted for each NUTS-3 unit, a synthetic gauge being an indicator of the socio-economic development was stated.

A synthetic gauge of the level of development assumes values from 0 to 1. The higher the value, the higher level of development of the phenomenon considered. Based on the indicators calculated, 73 NUTS-3 units in Poland were divided into five groups: very high, high, average, low and very low change in the level of socio-economic development in the years 2010-2019.

Figure 1 presents the results of the research conducted. It contains choropleths representing spatial variation of the changes in the socio-economic development of the 73 subregions in Poland in the period of 2010-2019.

3. EU fund absorption in Polish subregions

In the second stage of the research, the extent and structure of the EU fund absorption in Poland at the level of the NUTS-3 units is specified. An analysis of the use of the EU funds is conducted based on the "List of beneficiaries of the operational programs" database, generated for the SIMIK National IT System 2007-2013 as well as from SL2014 central tele-IT system and one published by the Polish Ministry of Funds and the Regional Policy on the European Fund website.

The basis for implementing the EU cohesion policy in Poland is composed of: the National Strategic Frameworks (National Cohesion Strategy) for the financial perspective of 2007-2013 as well as the Partnership Agreement for the programming period of 2014-2020. Strategic documents stated the priorities and activities for the regional policy. In the hereinabove mentioned documents, an assumption is made that the means from the Structural Funds (among which the following are to be found: the European Fund of the Regional Development as well as the European Social Fund), as well as the Cohesion Fund, constituted the main sources of funding of the regional policy in Poland (Spychała, 2016).

In the programming period of 2007-2013, the EU cohesion policy was implemented in Poland based on 16 Regional Operational Programs as well as 5 National Operational Programs: the Infrastructure and Environment, Innovative Economy, Human Capital, Development of Eastern Poland as well as Technical Aid. Within the financial perspective of 2014-2020, apart from 16 Regional Programs, within which the EU cohesion policy is to be found, also 6 National Operational Programs were realised: Infrastructure and the Environment, Intelligent Development, Digital Poland, Knowledge Education Development, Eastern Poland and Technical Aid.

Within the years 2007-2017, over 180,000 projects co-funded from the EU funds under the EU cohesion policy were realised in Poland, and the total value of funding obtained by the beneficiaries for the realisation of those projects was PLN 289.6 bn (i.e. around EUR 68.9 bn). In each of the 73 Polish

Table 1. Subregions of the highest and lowest values of the EU fund absorption per capita calculated for the respective factors of development

The highest values of the EU fund absorption (in PLN per capita)			The lowest values of the EU fund absorption per capita (in PLN per capita)		
No.	**Subregion NUTS-3**	**Value**	**No.**	**Subregion NUTS-3**	**Value**
Material capital					
1	Elblaski	10,857.34	73	Nowotarski	1,347.00
2	Trojmiejski	10,507.38	72	Pilski	1,392.25
3	Miasto Warszawa	10,069.84	71	Elcki	1,442.51
4	Wroclawski	8,409.39	70	Plocki	1,452.72
Human capital					
1	Olsztynski	6,322.35	73	Miasto Warszawa	1,255.04
2	Lubelski	5,488.38	72	Warszawski wschodni	1,573.04
3	Bialostocki	4,960.93	71	Zyrardowski	1,622.90
4	Rzeszowski	4,892.38	70	Trojmiejski	1,684.48
Natural environment					
1	Olsztynski	5,362.09	73	Koninski	1,210.80
2	Rzeszowski	4,773.59	72	Plocki	1,370.71
3	Elblaski	4,702.76	71	Pilski	1,378.32
4	Lubelski	4,576.79	70	Nowotarski	1,390.11
Innovativeness and entrepreneurship					
1	Miasto Wroclaw	5,512.82	73	Rybnicki	1,042.14
2	Miasto Kraków	5,491.64	72	Koninski	1,169.18
3	Lubelski	5,171.88	71	Zyrardowski	1,201.54
4	Miasto Poznan	4,882.99	70	Ciechanowski	1,271.75
Total absorption					
1	Olsztynski	23,311.34	73	Nowotarski	6,518.82
2	Elblaski	22,757.05	72	Koninski	6,521.94
3	Rzeszowski	22,608.17	71	Pilski	6,761.24
4	Lubelski	21,116.90	70	Plocki	7,448.57

Source: Own compilation based on the research conducted.

subregions, projects co-financed from the EU funds were realised. On average, in one NUTS-3 unit, 2,465 of such undertakings were realised. The smallest number of projects were realised in Szczecin (1,065), and the biggest number in the olsztyński subregion (12,691), the elbląski subregion (9,940) and the

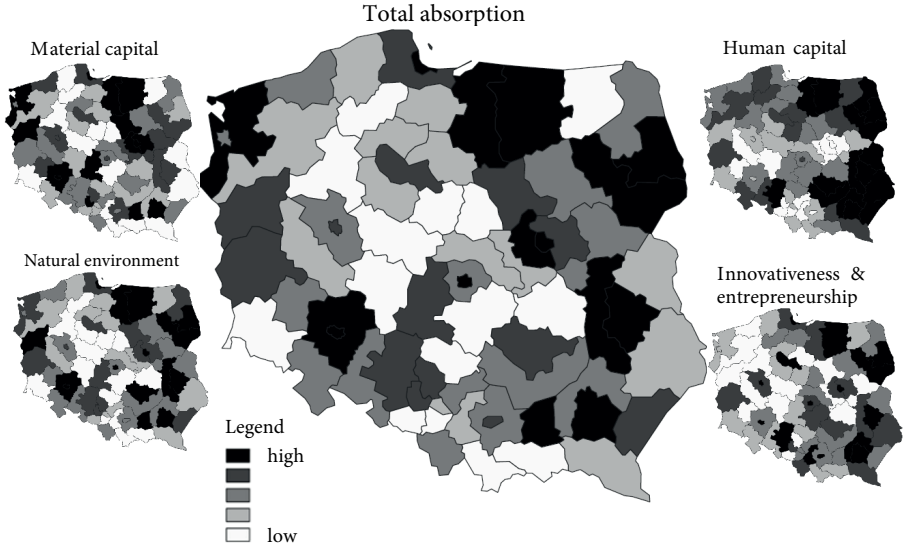

Figure 2. The EU fund absorption per capita in Poland within the arrangement of NUTS-3 units
Source: Own compilation based on the research conducted.

koniński subregion (8,297). The highest amount of the EU funds was involved in the realisation of projects in the capital city of Warsaw (PLN 32.1 bn—EUR 7.6 bn) and the lubelski subregion (PLN 15.0 bn—EUR 3,6 bn), and the average value of the total funding paid out in one NUTS-3 unit subregion was PLN 6.56 bn (EUR 1,56 bn).

The comparison of the size and structure of the EU fund absorption in the interregional arrangement required the introduction of data relativisation. For that purpose, the number of people was used, and the respective data was calculated in the per capita dimension. Most EU projects per 10,000 inhabitants were realised in the subregions of the warmińsko-mazurskie province: olsztyński (247) as well as elbląski (204), and the smallest number of projects—in Szczecin (26) and Warsaw (29). It is well worth noting the fact that most of the subregions of the biggest number of projects per 10 000 inhabitants are located in North-East Poland—within the area of the warmińsko-mazurski province. The abovementioned situation is an offshoot of a few factors: first—the regional authorities assumed the rule of preferring a bigger number of projects of relatively lower values; second—within the area of the province in the researched years, a relatively high unemployment was registered, therefore more projects concerning human capital and the job market were realised in that area; third—the beneficiaries from the warmińsko-mazurskie province were able to apply for funding also from the operational programs concerning the development of Eastern Poland; fourth—the province is one of a few which

were allowed access to means from the so-called initiative to the benefit of the employment of young people.

The next scope of the analysis was specifying the spatial variation of the EU fund absorption according to the structure of intervention in relation to the factors of socio-economic development: human capital, material capital, natural environment as well as innovativeness and entrepreneurship. The results of the research conducted formed the basis for specifying the correlations between the EU fund absorption and the change in the level of socio-economic development. The means from the European Social Fund were directed towards the development of the human capital, funds which were made accessible within the Operational Programs: Human Capital, Knowledge Education Development, as well as partly each Regional Operational Program. The means from the Regional Operational Programs were also in part devised towards the environmental protection as well as the development of innovativeness and improvement in the state of the material capital. The selected Infrastructure and Environment Operational Programs Activities supported the development of the material capital and the environmental protection. The support of innovativeness and entrepreneurship, i.e. means from the Operational Programs, were devised: Innovative Economy, Digital Poland and Intelligent Development. Based on the research conducted, it was established that in Poland in the years 2007-2017, the most means—38.8%—were directed towards the development of the material capital. The following 21.4% of the value of the EU funds were used to the benefit of development of the human capital, 20.0% of the means made available were used to the benefit of supporting innovativeness and entrepreneurship, and 19.8%—to the benefit of the environmental protection.

The results of the research conducted are presented in Figure 2 as well as Table 1. Table 1 presents the NUTS-3 units of the highest and lowest values of the EU fund absorption per capita. Figure 2 contains choropleths representing spatial variation in absorption in Poland in the subregional dimension.

4. Size of absorption and the level of development within the arrangement of NUTS-3 units

At the last stage of the research procedure conducted, a correlation between the extent of the EU fund absorption and the level of socio-economic development in 73 NUTS-3 units in Poland was specified. The hereinabove relations were researched separately for each subcategorised factor of development as well as for the socio-economic development as a whole. Based on the average value of the synthetic gauge characterising the change in the level of development as well as the average value of the EU fund absorption supporting the development of particular capital per capital, the subregions researched were divided into four groups (Figure 3 and Figure 4):

– group 1, in which the NUTS-3 subregions were subcategorised and an above-the-average change in the level of development of a particular factor was registered as well as above-the-average EU fund absorption;
– group 2 in which the units were subcategorized and a change in the level of development of a particular factor was registered as well as the EU fund absorption below the average calculated;
– group 3, in which the units were subcategorized and a change in the level of development of a particular factor below average was registered, as well as the EU fund absorption below average;
– group 4, in which the NUTS-3 subregions were categorized and a change in the level of development of a particular factor below average was noted as well as an above-the-average EU fund absorption.

Group 1 thus contains those NUTS-3 units in which the biggest change in the level of a particular factor was noted in the years 2010-2019 and, at the same time, high EU fund absorption devoted to the development of the capital researched. Group 2 included those subregions in which a high change in the level of development of the capital researched was included with relatively low EU fund absorption devoted to the development of a particular factor. Group 3 is composed of the subregions of relatively low EU fund absorption

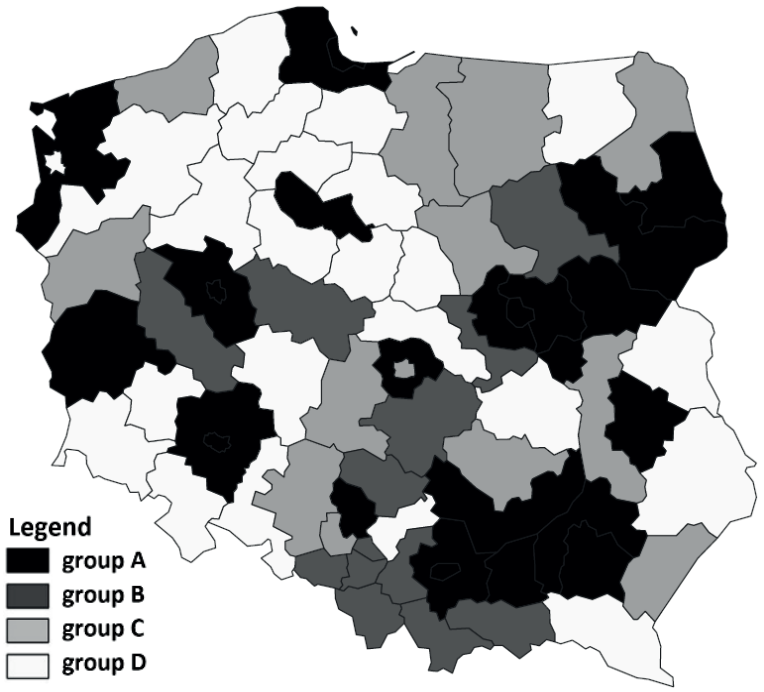

Figure 3. Classification of subregions based on the absorption of EU funds and the change in the level of development
Source: Own compilation based on the research conducted.

in the case of funds supporting the development of the researched capital as well as a relatively low value of the synthetic gauge. Group 4 includes units of the lowest efficiency of the Community funds used—despite the above-the-average EU fund absorption, the development of a particular capital in the years 2010-2019 was done to the low extent.

The subregions of the biggest change in the level of the socio-economic development as well as high EU fund absorption, include, above all, the follow-

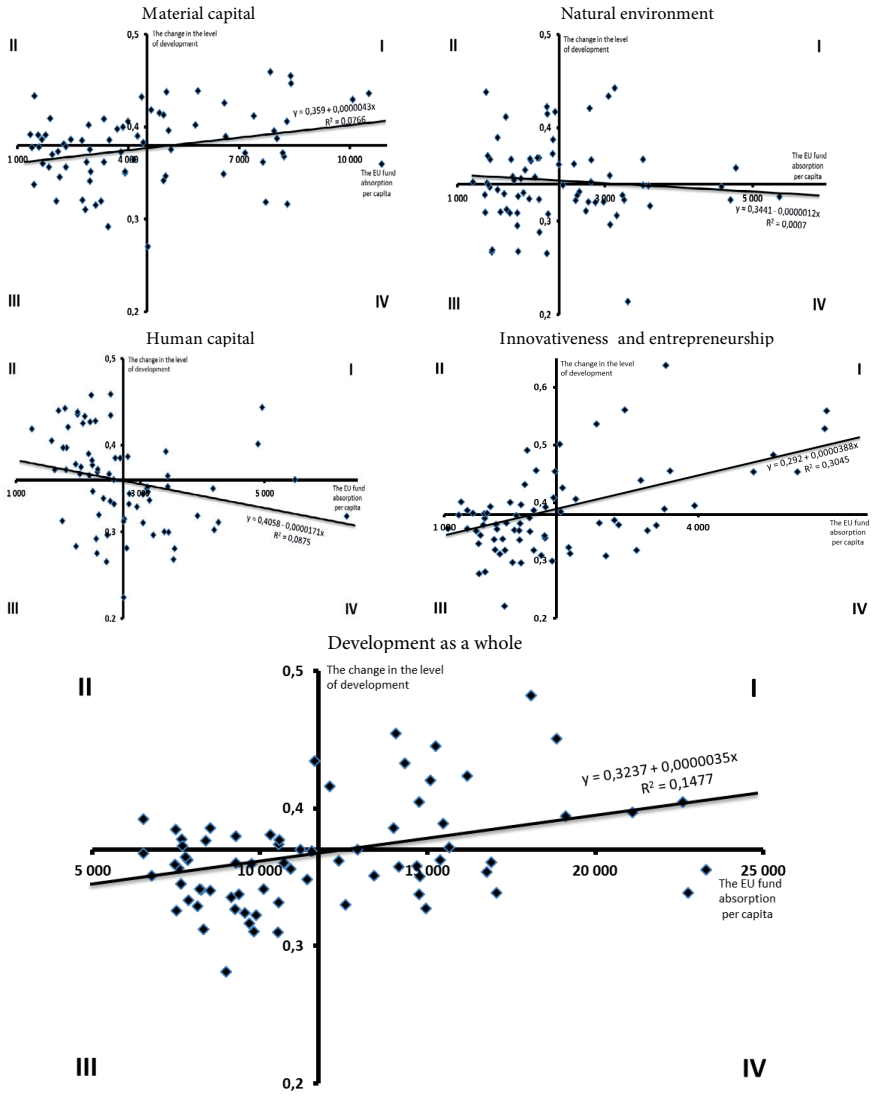

Figure 4. Charts of the EU fund absorption dispersion as well as changes in the level of socio-economic development of NUTS-3 units in Poland

Source: Own compilation based on the research conducted.

ing highly developed agglomeration areas: poznańska, warszawska, trójmiejska, krakowska and wrocławska. Moreover, group 1, also encompasses the subregions within the area of Białystok, Rzeszów, Bydgoszcz and Zielona Góra. The least active areas in terms of the EU fund absorption as well as an increase in the level of development included, among others: the NUTS-3 units of the central part of the łódzkie province, the świętokrzyskie subregions or the units of North-Eastern Poland. It is well worth noting that in nearly all subregions of the warmińsko-mazurskie province, in which the biggest number of EU projects were realised per 10 000 inhabitants, one of the lowest changes in the socio-economic development were noted. Based on that, the hereinabove mentioned subregions were included in the ineffective group no. 4, which also encompasses a big part of the NUTS-3 units from the opolskie, kujawsko-pomorskie and zachodniopomorskie provinces.

At the next step of the research, straightforward linear regression models between the researched variables are constructed within the respective factors of development (Table 2). A positive correlation is observed between the extent of the EU fund absorption in the case of the funds supporting development and the change in the level of development in the years 2010-2019 in the case of the material capital, innovativeness and entrepreneurship, as well as development as a whole (Table 3). In the case of the human capital as well as the natural capital, a negative correlation is registered.

Table 2. Linear regression models between the variables researched

Factor of development	Regression model pattern
Material capital	y = 0.359 + 0.0000043*x
Natural environment	y = 0.3441 - 0.0000012*x
Innovativeness and entrepreneurship	y = 0.292 + 0.0000388*x
Human capital	y = 0.4058 - 0.0000171*x
Total socio-economic development	y = 0.3237 + 0.0000035*x

Source: Own compilation based on the research conducted.

Based on the selected statistics of the models obtained, the explanatory value of the obtained regression functions is assessed as relatively low (alternatively as average). The highest value of the R^2 determination coefficient is obtained in the case of the model specified for innovativeness and entrepreneurship (0.30). In the case of this factor of development, the variability of the dependent variable has thus been explained through the independent variable in over 30%. One may thus acknowledge that the direction of the EU fund intervention in the case of funds supporting innovativeness and entrepreneurship is correct, and the proper direction of the EU fund intervention in the development of

Table 3. Parameters stating the quality of regression models within the arrangement of the respective factors of socio-economic development

Description	Material capital	Natural environment	Innovativeness and entrepreneurship	Human capital	Development as a whole
Correlation: absorption vs. development	positive	negative*	positive	negative	positive
R^2 determination coefficient	7.66%	0.07%	30.45%	8.75%	14.77%
Value p for F test	0.0170	0.8290	0.0000	0.0105	0.0007
F statistic value	5.97	0.05	31.53	6.91	12.48
Standard residue mistake	3.73%	4.22%	6.06%	5.11%	3.47%
Standard errors of parameter estimates	0.00000176	0.00000563	0.00000691	0.00000649	0.00000098
Sum total of residue squares	26.48%	37.50%	69.17%	52.34%	23.71%
Residual variability coefficient	9.86%	12.36%	15.86%	14.22%	9.50%
Akaike's information criterion	-274.74	-256.63	-203.04	-228.16	-285.55

* No statistically significant relationship was found.

Source: Own compilation based on the research conducted.

innovativeness has been confirmed by high EU fund absorption devoted for that purpose, a high number of newly created, highly innovative enterprises as well as modern solutions implemented in the economy. The highest quality of the regression model assessed for innovativeness and entrepreneurship is also confirmed by the fact that the explanatory variable turned out to be significant already at a very low level of significance, i.e. at the level of 0.00003% (the p-value for the parameter as well as the F-Snedecor statistic (Nowak, 2018—the probability of making a mistake). One may thus conclude that in the case of innovativeness and entrepreneurship, the regression model states the correct—a positive correlation between the EU fund absorption and the change in the level of innovativeness and entrepreneurship.

A synthetic gauge of empirical value dispersion around theoretical values is standard variation of the residue subcomponent. It informs about what is the average variation in empirical values of the explanatory value from the theoretical values obtained from the regression function. With an increase in the values of standard variation of the residue component, the statistical "goodness"

of the matching of a particular regression function to empirical data decreases. In the research conducted, positive and negative residue values were identified. The positive residue values indicate that the observed extent of the explanatory variable is higher than the expected one, resulting from the model. The negative residual values, however, prove the reverse situation to be the case. The lowest value of the residue standard fault is registered in the case of the model assessed for the level of the socio-economic development as a whole (3.47%). Relatively short distances from the trend line, and because of that, quite a good matching of the model is proven by the fact that the sum of the residue squares constitutes only 23.71% of the average for the change in the level of development in total. Moreover, taking account of the residue variability coefficient, one may consider a model as relatively well matching, as the value of the coefficient amounted to 9.5%[4] (such a part of the average value of the explanatory variable constitutes a standard residue variation). The real change in the level of the socio-economic development as a whole in the NUTS-3 units in Poland—apart from few cases—there is relatively little difference between the value obtained from the regression model.

Conclusions

Concluding the research concerning the impact of spatial variation of the EU fund absorption on the changes in the level of socio-economic development conducted in the article as well as the respective factors of development in the subregional dimension, i.e. within the arrangement of the NUTS-3 units in Poland, one may note that the positive correlation between the extent of the EU fund absorption per capita and the change in the level of development was identified in the case of material capital, innovativeness and entrepreneurship as well as development in total. In the case of the human capital as well as the natural environment, a negative correlation is registered. One may thus note that the EU fund absorption positively impacted the development of those factors (the subcomponents of development), within which the most EU fund allocation has been made available, which is related to the economies of scale. A negative impact is registered in the case of those factors in which the intervention turned out to be quite low.

Among all the assessed regression functions, the highest value is a model built within the analysis of the level of development of innovativeness and entrepreneurship, which explains 30% of the variability of the dependent variable, and the explanatory variable turned out to be significant already at the level of significance of 0.00003%. The satisfactory value of the model may also

[4] In the subject literature, a regression model is considered to be admissible if the residue changeability coefficient assumes a value lower than 20%.

result from a liberal approach to the manner of characterising the factor of development as well as extensive indirect indexing. Based on the analysis of the residue, best matching the reality is the model built within the analysis of the socio-economic development in total, in the case of which the respective coefficients assumed the lowest values. Therefore, summarising the research, one ought to conclude that the EU fund absorption to the largest extent impacted the changes in the level of innovativeness and entrepreneurship in the Polish subregions of the NUTS-3 level. The factors of development were the most heavily funded from the general EU budget, and the results of the EU fund absorption supporting innovativeness or the material capital are visible in a relatively short time period.

In relation to the hereinabove mentioned, one may thus conclude that in the context of the research conducted, one may not definitively state the correlations between the EU fund absorption and the change in the socio-economic level, and the results of the research procedure conducted are based solely on the statistical correlation, therefore their interpretation should be careful. It is certainly beyond doubt that the EU funds have made a positive influence on the socio-economic impact of particular subregions. It is very difficult, however, to state in a definite manner the scale of the impact, as the development registered in the research resulted from the interplay of different kinds of stimuli. Moreover, it is well worth noting that in the case of human capital as well as the natural environment, within which a negative correlation was observed (no statistically significant relationship for the natural environment), the results of the projects financed from the EU funds shall be visible only in a longer time frame, and therefore they have not been taken into account in the research conducted. Furthermore, it is a big difficulty to measure the level of innovativeness or the state of the natural environment, due to a lack of widely accessible objective criteria which would relate directly to the mentioned factors of development. With respect to the specificity of spending the means from the EU budget, it is therefore well worth considering in similar analyses prolonging the research period in order to take into account also the long-term impact of the EU aid funds.

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Fiscal transparency in recovery from the COVID-19 pandemic crisis

Edyta Małecka-Ziembińska
Poznań University of Economics and Business, Poland
https://orcid.org/0000-0002-3398-809X; Edyta.Malecka-Ziembinska@ue.poznan.pl

Abstract: The aim of the article is to present the impact of unprecedented fiscal measures taken in the context of the COVID-19 pandemic on fiscal transparency and to identify the role and importance of fiscal transparency in the process of recovering from the crisis. The conducted analysis proved that in the vast majority of countries around the world, the condition of public finances, measured by the deficit and public debt, has declined significantly as a result of measures taken to reduce the effects of the COVID-19 pandemic. These activities and strategies contribute to the lack of fiscal transparency. Meanwhile, fiscal transparency is an ally in recovering from the crisis. Strong fiscal frameworks (including numerical rules which promote fiscal prudence), backed by clear communication of policy priorities and fiscal transparency can meaningfully contribute to strengthening the credibility of public finances and reduce borrowing costs. These conclusions may be particularly important for emerging market economies and low-income developing countries, which find it more difficult and more expensive to obtain return sources of financing public investments.

Keywords: fiscal transparency, crisis, COVID-19, recovery.

Introduction

The debt crisis in the wake of the financial crisis of 2007–2009 highlighted the need for a clear demonstration of financial stability by general government and stricter and transparent reporting of fiscal data. In turn, the scale of interventions needed to deal with the challenges of healthcare and the economic consequences of the COVID-19 pandemic poses a serious challenge to the country's ability to purposefully, economically, efficiently and fairly manage resources in an unprecedented manner. By the end of 2020 alone, governments around the world mobilised nearly $ 14 trillion in various forms of fiscal support. It included additional spending, tax relief programs ($ 7.8 trillion) and loans and loan guarantees ($ 6 trillion). These funds were used to finance essential health services, counteract declines in incomes and prevent economic recessions. It is estimated that, as a result of the measures taken, the global public debt reached

98% of global GDP at the end of 2020 (International Monetary Fund [IMF], 2021a). Fiscal responses varied from country to country, generally they were much greater in richer countries. It is even indicated that the current scale of fiscal and central banks' stimulus once again has made us all Keynesians. These concerted actions pushed the state back to the centre of economic life, but its bigger role can also engender serious threats (Kowalski, 2021, p. 28).

The impact of the COVID-19 pandemic on public finances is widely studied both at the government level (Cho & Kurpierz, 2020; Joyce & Suryo Prabowo, 2020; Bouckaert et al., 2020; Raudla, 2021) and local government level (Kańduła & Przybylska, 2021), most often, however, in the context of the scale and strategy of operation. The aim of the article is to present the impact of unprecedented fiscal measures taken in the context of the COVID-19 pandemic on fiscal transparency and to identify the role and importance of fiscal transparency in the process of recovering from the crisis.

The article consists of an Introduction (1), three sections (2–4) and Conclusions (5). Section 2 presents an understanding of fiscal transparency and its importance for the effective and efficient recovery from the crisis. Section 3 presents the public finances of the European Union (EU) countries in 2019 and 2020, i.e. a year before and during the outbreak of the COVID-19 crisis. The analysis included expenditure, deficit / surplus and debt of the general government sector. Additionally, the general government deficit and debt projections until 2026 are presented. The projections take into account the division of the world's countries into three groups: advanced economies, emerging market economies and low-income developing countries. All data are presented as percent of GDP. Section 4 covers fiscal transparency in the context of the COVID-19 crisis. The article ends with Conclusions (5).

The adopted research methods are the analysis of the literature on fiscal transparency and simple descriptive statistics in the field of data on public finances. The analysis used the Eurostat data (on expenditure, deficit / surplus and debt of EU countries), International Monetary Fund (IMF) data (on deficit and debt of countries around the world) and International Budget Partnership (IBP) data (on fiscal transparency).

1. Fiscal transparency as a factor supporting recovery from the crisis (literature review)

Fiscal transparency refers to the information available to the public about the government's fiscal policymaking process. It refers to the clarity, reliability, frequency, timeliness and relevance of public fiscal reporting and the openness of such information. Fiscal transparency is a critical element of effective fiscal management. It also provides legislatures, markets, and citizens with the information they need to make efficient financial decisions and to hold govern-

ments accountable for their fiscal performance and the management and use of public resources (IMF, 2018, p. 1). Empirical evidence points to a positive relationship between the degree of fiscal transparency and sovereign credit ratings (Hameed, 2005; Alt & Lassen, 2006; Dabla-Norris and others, 2010; IMF, 2012, p. 5). Fiscal transparency also fosters lower public debt. In a transparent economy, inflating economic performances via debt is not beneficial since voters can disentangle this effect from the true ability of the government (Pancrazi & Prosperi, 2020, p. 2). A more transparent fiscal system provides policymakers with incentives to adopt better policies (Arbatli & Escolano, 2015, p.1) and improves the economic environment as it assists in the task of controlling inflation and guiding inflation expectations (Montes & Leitão da Cunha Lima, 2018, p. 27).

Global networks such as the Global Initiative for Fiscal Transparency (GIFT), which raise awareness of accountability concerns in the citizens-government relationship, highlight the importance of access to quality information to promote willingness to pay taxes. Literature provides evidence regarding the link between fiscal transparency and tax morale, within a policy framework aimed at reducing tax avoidance and evasion (Capasso, Cicatiello, De Simone, Gaeta & Mourão, 2021, p. 1032).

Fiscal transparency and its various aspects are considered in the context of financial sustainability. As part of the key research areas of the financial sustainability of the public sector, the following were identified: accounting and reporting of government interventions, identifying anchors for excessive public debts, public debt management, drivers and risk factors of local government' financial sustainability, the relationship between financial sustainability and revenue, debt and services, citizen participation in local government and accountability and transparency of local governments (Kakati & Roy, 2021, p. 45).

Both the IMF (2019) and the OECD (2002; 2017) have developed Codes of Best Practice for Fiscal Transparency. In some countries, the postulates of openness and transparency of public finances have the rank of a legal or even constitutional norm, e.g. in Poland (more in: Małecka-Ziembińska, 2021). The postulates of openness and transparency are identified as the basic principles of public finances that condition predictability and legal security. Openness and transparency of public finances are in the interest of both citizens (taxpayers) and public authorities. By respecting these postulates, taxpayers know how and for what purposes the money from the taxes they pay is spent, and the government has an argument that creates an opportunity to limit the power of various groups of pressure on public funds, which helps to optimise the size of public funds and rationale their spending (Szpringer, 2016, p. 54). Transparency of public finances, which determines the quality of budgetary data, is also crucial to the proper functioning of the budgetary surveillance framework of the European Union. The regular availability of timely and reliable fiscal data is the key to proper and well timed monitoring, which in turn allows prompt ac-

tion in the event of unexpected budgetary developments. A crucial element in ensuring the quality of fiscal data is transparency, which must entail the regular public availability of such data (Council Directive 2011/85/EU, point 4 of the preamble).

Unfortunately, fiscal adjustment programs (like some aimed at satisfying the Maastricht Treaty criteria or national fiscal rules) can employ or produce creative accounting practices. Such practices may also be prompted by emergency and crisis situations that require non-standard actions. The lack of fiscal transparency increases information asymmetry and creates more uncertainties in the economic environment.

In the light of the presented considerations, fiscal transparency is crucial in the context of countries recovering from the crisis caused by the COVID-19 pandemic. According to the IMF, governments that commit to sound public finances and that achieve high levels of fiscal transparency reap meaningful benefits: their budgets are more credible, their announcements are better perceived by the media and they pay lower interest rates on their debt (IMF, 2021b, p. 34). To emphasise the importance of fiscal transparency in the process of recovering from the crisis caused by the COVID-19 pandemic, the IMF entitled the Fiscal Monitor, October 2021 as "Strengthening the Credibility of Public Finances".

2. Public finances in the context of the COVID-19 crisis

As a result of the activities related to the COVID-19 pandemic, all EU countries experienced a real increase in expenditure (in relation to GDP), deepening of the deficit and an increase in the public debt of the general government sector. In general, the deepening of the general government deficit was comparable to the increase in its expenditure, while the increase in debt was clearly higher (Table 1 and Figure 1).

This increase in public debt was fully justified by the need to respond to COVID-19 and its economic, social and financial consequences (IMF, 2021b, p. ix). However, it is necessary to reduce it, which will be one of the most important challenges of the future. The costly service of high public debt limits the financing of other important social and economic goals. For example, increased public debt and its servicing costs limit the possibilities of financing innovations, which are essential for economic growth and development (Shkurat & Temerbek, 2021).

As we can see in Table 2, fiscal responses have been shaped by access to financing: average overall deficits as a share of GDP in 2020 amounted to -10.8 percent for advanced economies, -9.6 percent for emerging market and middle-income economies and -5.2 percent for low-income developing countries. The increase in the general government deficit and non-sectoral liabilities re-

Table 1. General government expenditure, deficit/surplus and debt as percent of GDP in EU countries in 2019 and 2020

Countries	Expenditure		Deficit/surplus		Debt		Expenditure	Deficit/surplus	Debt
	2019	2020	2019	2020	2019	2020	2020-2019 (in percent points)		
EU—27 countries (from 2020)	46.5	53.1	–0.5	–6.9	77.2	90.1	6.6	–6.4	12.9
Euro area—19 countries (from 2015)	46.9	53.8	–0.6	–7.2	83.6	97.3	6.9	–6.6	13.7
Belgium	51.8	59.2	–1.9	–9.1	97.7	112.8	7.4	–7.2	15.1
Bulgaria	35.5	41.8	2.1	–4.0	20.0	24.7	6.3	–6.1	4.7
Czechia	41.1	47.2	0.3	–5.6	30.0	37.7	6.1	–5.9	7.7
Denmark	49.5	53.4	4.1	–0.2	33.6	42.1	3.9	–4.3	8.5
Germany	45.0	50.8	1.5	–4.3	58.9	68.7	5.8	–5.8	9.8
Estonia	39.4	45.9	0.1	–5.6	8.6	19.0	6.5	–5.7	10.4
Ireland	24.2	27.4	0.5	–4.9	57.2	58.4	3.2	–5.4	1.2
Greece	47.9	59.8	1.1	–10.1	180.7	206.3	11.9	–11.2	25.6
Spain	42.1	52.4	–2.9	–11.0	95.5	120.0	10.3	–8.1	24.5
France	55.4	61.6	–3.1	–9.1	97.5	115.0	6.2	–6.0	17.5
Croatia	46.0	54.5	0.3	–7.4	71.1	87.3	8.5	–7.7	16.2
Italy	48.5	57.1	–1.5	–9.6	134.3	155.6	8.6	–8.1	21.3
Cyprus	38.4	45.1	1.3	–5.7	91.1	115.3	6.7	–7.0	24.2
Latvia	38.2	43.1	–0.6	–4.5	36.7	43.2	4.9	–3.9	6.5
Lithuania	34.8	42.9	0.5	–7.2	35.9	46.6	8.1	–7.7	10.7
Luxembourg	42.9	47.2	2.3	–3.5	22.3	24.8	4.3	–5.8	2.5
Hungary	45.7	51.6	–2.1	–8.0	65.5	80.1	5.9	–5.9	14.6
Malta	35.9	45.9	0.5	–9.7	40.7	53.4	10.0	–10.2	12.7
Netherlands	42.0	48.0	1.7	–4.2	48.5	54.3	6.0	–5.9	5.8
Austria	48.6	57.1	0.6	–8.3	70.6	83.2	8.5	–8.9	12.6
Poland	41.8	48.7	–0.7	–7.1	45.6	57.4	6.9	–6.4	11.8
Portugal	42.5	49.3	0.1	–5.8	116.6	135.2	6.8	–5.9	18.6
Romania	36.3	42.2	–4.4	–9.4	35.3	47.4	5.9	–5.0	12.1
Slovenia	43.3	51.3	0.4	–7.7	65.6	79.8	8.0	–8.1	14.2
Slovakia	40.7	45.6	–1.3	–5.5	48.1	59.7	4.9	–4.2	11.6
Finland	53.2	57.3	–0.9	–5.5	59.5	69.5	4.1	–4.6	10.0
Sweden	49.1	52.5	0.6	–2.8	34.9	39.7	3.4	–3.4	4.8

Source: (Eurostat).

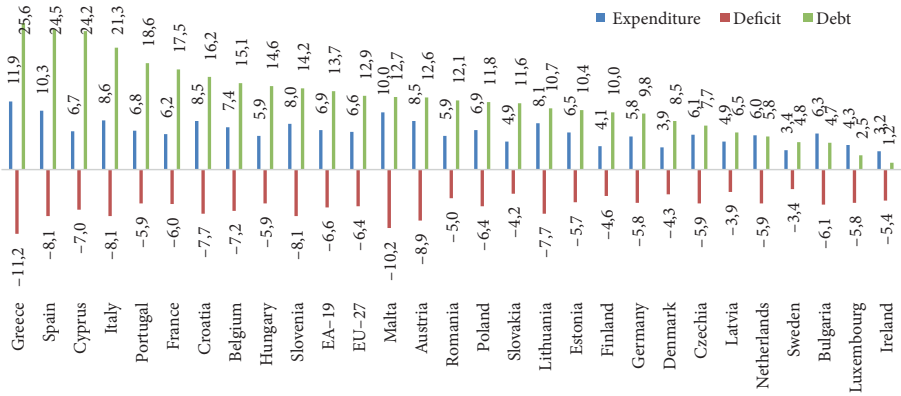

Figure 1. Increases in general government expenditure, deficit and debt between 2019 and 2020 in EU countries in percent points

Countries were ranked according to the highest increase in general government debt.
Source: (Eurostat).

Table 2. General government fiscal balance and debt (percent of GDP), 2019–2026 (projections)

	2019	2020	Projections					
			2021	2022	2023	2024	2025	2026
General government fiscal balance (percent of GDP)								
World	–3.6	–10.2	–7.9	–5.2	–4.2	–3.8	–3.6	–3.5
Advanced Economies	–3.0	–10.8	–8.8	–4.8	–3.6	–3.2	–3.1	–3.0
Emerging Market Economies	–4.7	–9.6	–6.6	–5.8	–5.2	–4.8	–4.4	–4.1
Low-Income Developing Countries	–3.9	–5.2	–5.4	–5.0	–4.5	–4.3	–4.1	–3.9
General government debt (percent of GDP)								
World	83.6	98.6	97.8	96.9	97.0	96.9	96.8	96.5
Advanced Economies	103.8	122.7	121.6	119.3	119.3	119.1	118.8	118.6
Emerging Market Economies	54.7	64.0	64.3	65.8	67.1	68.2	69.0	69.8
Low-Income Developing Countries	44.2	49.9	50.2	49.8	49.0	48.5	48.0	47.3

Source: (IMF, 2021b, database).

sulted in an increase in public debt in relation to GDP by: 18.9 percent points (pp) for advanced economies, 9.3 pp for emerging market and middle-income economies and 5.8 pp for low-income developing countries. According to the IMF's projections, general government deficit in relation to GDP will be re-

duced to the pre-crisis level by 2025. However, a possible reduction of general government debt in relation to GDP requires a definitely longer time horizon.

Lowering the deficit and public debt to the pre-crisis level will require many years and numerous structural changes, e.g. in the area of taxation. As it becomes more difficult to access low-cost borrowing, especially for emerging markets and low-income developing countries, governments should strengthen the credibility of their fiscal policy. Committing to fiscal sustainability with credible frameworks—the set of rules and institutions that guide fiscal policy—can give time and make debt stabilisation or reduction less painful (IMF, 2021b, p. xii).

3. Fiscal transparency in the context of the COVID-19 crisis

The International Budget Partnership (IBP) was formed in 1997 to advocate transparent, inclusive and accountable government budget processes as a means to improve governance and reduce global poverty. The goal of the organisation is to ensure that governments become the responsible managers of public funds. It works with social partners from over 120 countries and uses a multilateral network of international institutions, donors, private and public sector actors to ensure citizens understand and have the right to influence how public money is collected and spent. Since 2006 IBP has conducted the biannual Open Budget Survey (OBS), a unique, global, independent and comparable measure of government practices in budget transparency, participation and oversight. OBS is a global research program aimed at promoting public access to budget information and the adoption of inclusive and accountable budget systems. So far, seven assessments of fiscal transparency, public participation and formal oversight have been conducted. The Open Budget Survey 2006 examined 59 countries, and its last iteration (in 2019) covered 117 countries.

OBS takes into account the basic aspects of governance and accountability: transparency (is comprehensive budget information from central authorities available to the public within a useful timeframe?); participation (do citizens, including the most vulnerable, have formal and meaningful opportunities to get involved in the national budgetary process?); supervision (are there and properly functioning institutions of supervision, such as the legislature, national audit office, independent tax institutions?). The budget transparency score (also known as the Open Budget Index) measures the public availability of eight key budget documents which together provide a complete picture of how public money was obtained, planned and spent during the financial year. To be considered "publicly available", documents must be published on the Internet within a good practice timeframe and must contain comprehensive and useful information. Index values range from 0 to 100, with a score of 61 or higher indicating that the country is likely publishing enough material to support an informed public debate on the budget.

In late 2020, the IBP also examined how governments managed initial fiscal policy responses to COVID-19. Nearly 400 fiscal initiatives taken between March and September 2020 to address the consequences of the COVID-19 crisis were examined in 120 countries. The 3 largest or most important packages were selected in each country and assessed for transparency, oversight and participation. As a result of the study, the countries included in it were assigned, in terms of the level of responsibility in early fiscal policy responses to COVID-19, to 1 of 5 groups: substantive—0 countries; adequate—4; some—29 (including Poland); limited—55; minimal—32 (Table 3).

Table 3. Levels of accountability in early COVID fiscal policy responses

Level of accountability	No. of countries (out of 120)	Countries
Substantive	0	–
Adequate	4	Australia, Norway, Peru, Philippines
Some	29	Bangladesh, Brazil, Bulgaria, Canada, Chile, Colombia, Costa Rica, Croatia, Fiji, France, Germany, Indonesia, Italy, Jamaica, Japan, Kyrgyz Republic, Mongolia, New Zealand, Nigeria, Paraguay, Poland, Portugal, Sierra Leone, Slovakia, Slovenia, South Africa, Sweden, United Kingdom, United States
Limited	55	Afghanistan, Angola, Argentina, Armenia, Azerbaijan, Bolivia, Bosnia and Herzegovina, Botswana, Cameroon, China, Côte d'Ivoire, Czech Republic, Dominican Republic, Ecuador, El Salvador, Georgia, Ghana, Guatemala, Honduras, Jordan, Kazakhstan, Kenya, Lesotho, Liberia, Macedonia, Madagascar, Malaysia, Mali, Mexico, Moldova, Mozambique, Namibia, Nepal, Nicaragua, Niger, Pakistan, Papua New Guinea, Romania, Russia, Rwanda, Senegal, Serbia, Somalia, South Korea, Spain, Sri Lanka, São Tomé e Príncipe, Thailand, Timor-Leste, Togo, Trinidad and Tobago, Uganda, Ukraine, Vietnam, Zambia
Minimal	32	Albania, Algeria, Benin, Burkina Faso, Burundi, Cambodia, Chad, Comoros, Dem. Rep. of Congo, Egypt, Equatorial Guinea, Eswatini, Ethiopia, Hungary, India, Iraq, Lebanon, Malawi, Morocco, Myanmar, Qatar, Saudi Arabia, South Sudan, Sudan, Tajikistan, Tanzania, The Gambia, Tunisia, Turkey, Venezuela, Yemen, Zimbabwe

Source: (International Budget Partnership (IBP), 2021, p. 3).

The main finding of the research is that governments have failed to manage the fiscal policy response to the crisis in a transparent and accountable manner. Close to three quarters of governments ensured only a limited or minimal level of accountability in implementing their early fiscal policy responses.

Governments have taken a number of fiscal initiatives under time pressure, while limiting the role of the legislature and loosening the procurement process. There is also a lack of adequate information on the amount of money spent on reducing the impact of the pandemic and its actual impact on the most disadvantaged and vulnerable groups in society. Governments have not taken key measures such as full reporting or timely audit to strengthen accountability. The decision-making process omitted the participation of the public, especially of those most affected by the crisis, which weakened the effectiveness of the implemented anti-crisis programs.

By contrast, a comparison of the 2019 and 2021 survey results suggests that countries with stronger liability regimes in normal times tend to be more responsible also in times of crisis (IBP, 2019; IBP, 2021, p. 3–10). Many countries that have suspended their rules during the pandemic are thus considering recalibrating them to accommodate higher debt levels and provide more flexibility after the crisis. On the one hand, revisions of rules can improve the credibility of the framework because adhering to an unrealistic target increases the likelihood that it will be violated in the future. On the other hand, revising the target may signal weaker commitment to fiscal sustainability (IMF, 2021b, p. 30).

Conclusions

In the vast majority of countries around the world, the condition of public finances, measured by the deficit and public debt, has declined significantly as a result of unprecedented measures taken to reduce the effects of the COVID-19 pandemic. Unfortunately, these activities and strategies contribute to the lack of transparency of public finances. Large-scale expenditure is made without public procurement procedures and an assessment of their effectiveness.

Meanwhile, fiscal transparency is an ally in overcoming the crisis. It positively influences the state rating, and thus contributes to lowering the cost of public loans. It also has a positive effect on the morality of taxpayers, reducing the scale of tax avoidance and evasion.

The challenges of states in the face of structural and demographic problems, as well as those resulting from membership in various organisations (e.g. the EU) and related to the COVID-19 pandemic, require credibility and transparency as well as an integrated and holistic approach to public finances and their reforms. Strong fiscal frameworks (including numerical rules which promote fiscal prudence), backed by clear communication of policy priorities and fiscal transparency can meaningfully contribute to strengthening the credibility of public finances and reduce borrowing costs. These conclusions may be particularly important for emerging market economies and low-income developing countries, which find it more difficult and more expensive to obtain return sources of financing public investments.

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Housing conditions in social housing stock vs marginalisation risk—evidence from Poland[1]

Zuzanna Rataj
Poznań University of Economics and Business, Poland
https://orcid.org/0000-0001-7442-0030; zuzanna.rataj@ue.poznan.pl

Katarzyna Suszyńska
Poznań University of Economics and Business, Poland
https://orcid.org/0000-0003-4540-8352; katarzyna.suszynska@ue.poznan.pl

Abstract: Low-income households in the Polish public housing stock sometimes encounter the risk of housing exclusion, yet this experience is relatively more frequent among the tenants of council flats. This situation is reinforced by legal regulations that allow a lower standard for this type of public stock. The result is that low-income households, unable to satisfy their housing needs on their own, must use the public stock, the conditions of which do not always reflect the contemporary standards of housing culture, thus increasing the risk of housing exclusion. The aim of this paper is to present the results of research on housing standards in the public housing stock in Poland. Pursuant to Polish law, social housing is part of public housing assistance (Przymeński 2016), addressed to very-low- and low-income households which are not capable of satisfying their housing needs on their own. The paper uses desk research, statistical data analysis and questionnaire interviews with dwellers of council flats in Poland. Furthermore, the achievements of international housing policy are taken into account. The results show that the standard in the public stock, especially in council flats, in Poland is poor and hinders low-income households in addressing their housing needs. Small areas of dwellings, overcrowding, low quality of building materials are all identified as significant determinants increasing the risk of housing exclusion in council flats.

Keywords: housing conditions, social housing, low-income households, marginalisation risk, Poland.

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Introduction

Housing is a fundamental right of every individual (Hui Yap and Hua Ng 2017) and plays a vital role in the urban economy (Suhaida et al. 2010). The right to housing is guaranteed by international legislation (among others: the Universal Declaration of Human Rights, the European Social Charter) as well as domestic regulations: in Poland mainly by the Constitution (Constitution of the Republic of Poland of 1997). Despite Article 75 of the Polish Constitution stipulating those public authorities *shall pursue policies conducive to satisfying the housing needs of citizens, in particular prevent homelessness, promote the development of social housing and support citizens' activities aimed at acquisition of their own home* [Constitution of the Republic of Poland dated 2 April 1997], the most impoverished groups have limited options to satisfy their housing needs. In 2015, Poland managed to eliminate the deficit of housing in general, yet the segment of social housing still experiences a considerable deficiency of dwellings, which results from severe wear and tear of the public stock, a low number of affordable-rent dwellings, a loss of dwellings due to privatisation and a low number of new ones incorporated into the stock. It is difficult to estimate the size of the housing shortage in Poland because the quantitative data referring to statistical housing deficit do not take substandard units into account. The number of substandard flats (assessed on the basis of data from the 2011 National Census) amounts to more than 1.3 mln (10.6% of the total number of flats). It is equally difficult to assess the scale of demand for social tenancy flats. Depending on the applied methodology and measurement tools, the results obtained differ significantly (Suszyńska & Rataj 2017). The research conducted in 2014 by the Institute of Urban Development showed that the general demand for municipal flats in cities amounted to 300 thousand flats, including 175 thousand municipal premises and 125 thousand social ones (Instytut Rozwoju Miast 2015). In 2012, Polish Ministry of Transport, Construction and Marine Economy conducted a survey among 55 municipalities that brought noteworthy results. The purpose of the analysis was to estimate the scale of demand for social flats and for flats with an indefinite term of tenancy. The surveyed municipalities boasted a stock of almost 420 thousand flats (approx. 42% of the total municipal housing stock). The results showed that the number of households waiting for a dwelling from municipal resources amounted to 24 thousand, whereas the number of households waiting for a social dwelling reached 33 thousand (MTBiGM 2012, Suszyńska & Rataj 2017).

The aim of this paper is to explore various components of housing standards in the public housing stock in Poland and their influence on housing exclusion risk. The paper begins with a review of literature on the quality of life, factors influencing the provision of good quality housing and a review definition of housing exclusion. The empirical analysis is mainly based on Polish sources. The structure of the article is as follows: the paper begins with a literature re-

view on the quality of life and housing environment; sections two and three discuss the housing situation in Poland and the impact of housing standards on housing exclusion; section four summarises the main findings of the paper. The paper falls into the field of economic-socio-political analyses and is based on sociological and economic research as well as existing materials and own research. The paper uses descriptive analysis, desk research and questionnaire interviews carried out among dwellers of council flats and in public administration institutions responsible for the provision of the housing stock.

1. Literature review

Quality of life is defined as a concept of economics, sociology and political science which encompasses an individual's spiritual (emotional), social and physical well-being (Ruževičius 2016). The World Health Organization presents an expanded definition of quality of life by including aspects of individuals' physical and psychological health, their degree of independence, their social liaisons and how they relate to their surroundings (McCall 2005; Ruževičius 2012). Moreover, quality of life depends on the individual's value system and on the cultural environment where she or he lives (Gilgeous 1998). Quality of life encompasses objective indicators as well as subjective evaluations (Merkys et al. 2008).

One of the most important factors contributing to the quality of life is housing, as it serves to define the living space of a person. Housing standard is a complex term which is composed of many elements determining its level. These include objective and measurable factors which may be determined based on general recommendations, and subjective factors which are far more difficult to measure. Barek points out that today, functional-quantitative indicators are insufficient to determine housing standard. They have to be completed with technical, spatial, service-, safety- and social ties-related indicators [Barek 2009, p. 146]. In this concept, housing standard is defined in terms of a home and the environment surrounding it. A similar approach is presented by Wilczek, according to whom the standard of housing stock, also referred to as the standard of use, refers to the building, its surroundings and the living space—so these are both functional and technical indicators (Wilczek 2010, p. 31). According to the definition of Cornwall Council, housing standards mean homes built to the standards relating to but not limited to space, design, quality and sustainability approved in writing by the Council (Country Planning Act, 1990).

Moreover, housing is one of the best known and documented determinants of health. As Ineichen (1993) emphasises, certain themes stand out in this context—the influence of housing on: physical, mental and emotional health, health-related design features of housing, the association of housing and: poverty, disadvantaged groups, blurring distinctions between owners and renters;

growing public awareness of health issues in housing; and the changing role of public health agencies. The affordability, location, and quality of housing have all been independently linked to health. Poor quality housing and blighted neighbourhoods diminish property values, increase crime and erode the cohesiveness and political power of communities (Benjamin & Vernon 2014).

Among the broad spectrum of indicators describing housing standard as proposed by the NCHH and APHA, the authors deem the following ones to be of most importance in the context of this paper:

- adequate—shall mean sufficient to accomplish the purpose intended without unreasonable risk to human health or safety;
- safe and healthy—shall mean the condition of being free from danger and chemical, biological and physical agents that may cause injury, disease or death; and fit for human occupancy.

When attempting to define housing environment, it is worthy of note that this term refers not only to the narrow category of a dwelling itself, but also to the entire building and its surroundings—the natural environment around and the quality of space. Authors dealing with the problems of housing treat this environment, in its narrow meaning, as the space that a family has at its disposal and may use to carry out its tasks and related activities and uses, as far as practicable, according to its own needs, system of values and preferences (Kaltenberg-Kwiatkowska ed. 1982). From a broader perspective, a dwelling is treated by researchers as a place where not only the goals of the family may be pursued but also those of the state (e.g. the goals of the pro-natalist policy), or as a tool to pursue the goals of employment (ibidem). The broader definition of the term refers to the surroundings of the dwelling. In his definition of housing environment, Andrzejewski includes not only the area intended specifically for living but also the natural environment having impact on an individual. The space around a flat or house is part of housing environment (Turowski 1979). This is, to a large extent, the natural environment, i.e. green areas, including children playgrounds, gardens, parks and other places intended for leisure for the inhabitants of a specific area. Housing environment is said to include also the micro-space around, i.e. paths and alleys, squares, houses or the block of flats. In his work "Środowisko mieszkalne w świadomości ludności miejskiej", Turowski divided housing environment into: micro-environment encompassing the dwelling itself and the space around; broader housing environment encompassing the housing complex, the estate, the town district; and the macro-environment encompassing the roads, communications and transport channels, devices, the general urban facilities and the town/city.

Housing standard and quality of life are much linked to housing environment. There are no doubts that the housing situation has an impact on the quality of life. Individuals living in old, small, poorly illuminated, not renovated dwellings will assess their quality of life worse than dwellers of newly-constructed flats. In order to analyse the impact of the housing situation on

the quality of life, the authors will use empirical indicators of both observable and subjective phenomena named by dwellers of council flats. The empirical indicators which directly describe the impact of the housing situation on the quality of life regard primarily housing infrastructure. The most important one is the size of the dwelling and the number of individuals occupying it. Regard is taken of the number of rooms, the size of the dwelling per one dweller and the total number of dwellers. Another infrastructure-related indicator is the utilities. The authors include the following in this category: running water, electricity and gas, central heating (they are treated as connected utilities) as well as a toilet inside the dwelling. The subjective indicators will refer to the assessment of the occupied dwelling in terms of accessibility to various types of urban facilities (shopping malls, cultural and educational institutions, workplaces), satisfaction with the occupied dwelling, the sense of safety and relations with the neighbours.

Much of the recent debate about housing inequality, both in the academic literature and in the sphere of politics (especially within the European Union), has been framed in terms of "social exclusion" (Ratcliffe 1999). However, under the auspices of FEANTSA/EOH, a common definitional framework was developed in order to understand the varying phenomena that countries refer to as housing exclusion. It is defined as poor housing outcomes (insecure and inadequate housing), out of which homelessness (defined as being houseless or roofless) can be viewed as an extreme form (Edgaret 2012). It should be emphasised, however, that insecure and inadequate housing may be evoked by various factors. According to Edgaret, the dimensions that affect housing standards most are:

- physical standards (e.g. sanitary facilities, heating, space),
- social standards (privacy, space for social interaction),
- legal status (tenure form, the right to possess or rent the unit for a particular period of time, the relationship to the household member that holds the legal tenure).

Taking into account the domains inherent to inadequate and insecure housing, most of the public housing stock in Poland is burdened with some physical, social or legal disadvantages.

2. Factors affecting housing standard in the public stock

Housing standards are important because they determine directly the extent to which housing needs are met and the size of the demand both for new dwellings and renovation services. It is reflected in the stock of sub-standard flats the dwellers of which, despite having a flat as an independent unit, often have housing needs that are still unmet. Housing standard is a complex term composed of many factors determining it. These are objective, or measurable, factors,

which may be determined based on some general principles, but also subjective ones, much more difficult to measure. The standard of housing stock thus refers to the building, the surroundings and the living space (Wilczek 2010, p. 31).

Functional indicators are going to be used to evaluate the standard of residential buildings. They include the usable floor area of flats, the number of rooms in a flat, the number of individuals living in a flat and the number of people per one room. The functional indicators as a whole influence mainly the assessment of the attractiveness of the particular buildings by the users and the possibilities to fully meet one's housing needs.

Technical indicators of the housing stock standard refer mainly to the issue of whether flats are furnished with proper infrastructure, as well as to the type of the materials used and the age of the buildings. The analysis below will include the age of the buildings and the utilities they are furnished with as well as the number of renovations aimed at increasing the standard of the existing stock.

Quantitative indicators of the housing standard regard the number of completed dwellings, the number of lacking dwellings, the number of dwellings per 1000 people. The number of dwellings per 1000 married couples is also taken into consideration. Young married couples as households with no considerable financial resources, leaving their family homes, are one of the groups at risk of being affected by the lack of appropriate size and quality of flats at prices affordable to them.

In addition to objective indicators, the subjective ones, expressing the impressions of the dwellers, are also very important in the assessment of the quality of life. Sometimes, it may happen that despite all possible amenities, a person living in a flat will not be happy with it due to other factors. The authors have decided to verify how dwellers of council flats assess the living conditions and what impacts their satisfaction with the dwelling occupied, whether they notice any good qualities or only the bad ones and whether they would like to change the flat occupied currently to another one. Next, the authors asked questions concerning the evaluation of the estate infrastructure and safety. The belief is that people are the best judges and an assessment of well-being can only be done from a straightforward approach through a survey of some kind (Frey & Stutzer, 2002).

3. Findings

The quality of living conditions in Poland rise gradually, yet to a small extent, which is demonstrated by the growing average usable floor area of flats or the dropping number of people in a flat and number of people per 1 room. The positive qualitative changes translate into the housing needs of the citizens being met better and the costs of use of dwellings being lower (Rataj 2018, p. 82). Based on the news releases of the Polish Central Statistical Office (GUS)

for 2019, it may also be noted that the housing situation of households kept improving. The average household in 2019 occupied a dwelling of 80.4 sq. m with three rooms (GUS 2020).

The technical indicators of the housing stock standard refer mainly to the utilities with which flats are furnished, but also to the type of the materials used and the age of buildings. Analysed below are the age of the building and its utilities as well as the number of renovations aimed at improving the standard of the existing stock.

The situation in dwellings in terms of technical and sanitary utilities in 2015-2018 improved in terms of all types of utilities. The highest number of dwellings are connected to a water supply system, the lowest number to a gas network. To some extent, it results from the gradual resignation from gas stoves and replacing them with induction cooktops which use electricity. In such a case there is no need to use gas in a dwelling. The increase in the number of dwellings furnished with central heating may also reduce the need to heat dwellings with gas from the network. This situation increases the households' quality of living and at the same time allows them to better satisfy their housing needs.

There are disproportions between urban and rural areas in terms of fitting a dwelling with basic utilities, such as central heating, water supply or a bathroom (except for gas installations). Dwellings located in urban stock are better fitted but usually have a smaller average usable floor area with also lower number of people occupying one flat. In urban areas, the average usable floor area of a dwelling and the number of people per room was lower than in rural areas (64.7 sq. m of usable floor area in urban areas and 94 sq. m of usable floor area in rural areas and 0.66 person per 1 room vs 0.74 person per room respectively), whereas the total number of people in a dwelling was better in urban areas where it was 2.34 person in 2018, while in rural areas it was 3.23 person. The data show that the overcrowding risk is a bigger concern in rural areas, which is backed up also by the Eurostat data.

The improvement of housing standard in terms of fitting a dwelling with technical and sanitary utilities is also influenced by renovations. The Census from 2011 showed a decrease in the number of dwellings constructed by 1988 as compared to 2002. This indicator means a growth of new dwellings. The increase of the number of dwellings in the newest stock, since 2003, amounted to 109.77 thousand dwellings in 2011, while the decrease amounted to 82.51 thousand dwellings. This means that the increase of dwellings compensates for the lack of dwellings from the oldest stock by 27.26 thousand dwellings.

An analysis of the data shows that the number of dwellings per 1000 people within the period under analysis clearly increases. Despite sporadic increases of the discussed indicator, the number of dwellings per 1000 people is low, whereby the total number of marriages solemnised in Poland since 2016 has been decreasing. The number of dwellings per 1000 married couples shows

that, depending on the year, from 25 to 40% of the newly formed households have limited housing options.

The qualitative aspect of the housing economy is largely influenced by sub-standard dwellings. The number of sub-standard dwellings (estimated based on NC data from 2011) is more than 1.3 mln. This problem is particularly acute in rural areas, where nearly 20% of dwellings are of extremely low standard; in comparison, this indicator is around 7% in urban areas (Suszyńska & Rataj 2017).

When analysing the qualitative aspect of the housing economy, the overcrowding indicator is an interesting element worth taking into consideration. It is defined based on the number of rooms available for a household, its size, family circumstances and the age of its members. In 2018, approximately 17.1% of EU-27 population lived in overcrowded spaces. This indicator fluctuated from below 5.0% in Cyprus, Ireland, Malta, the Netherlands and Spain to more than 35% in Slovakia, Poland, Croatia, Bulgaria, Latvia and Romania, the latter having noted the highest level of 46.3%.

People living in large cities of nearly all EU-27 countries more often live in overcrowded homes than those living in rural areas, and those living in rural areas more often live in overcrowded homes than people living in smaller towns and in the suburbs. In 2018, 18.7% of the inhabitants of large cities in the EU-27 countries lived in overcrowded homes, whereas the number for people living in rural areas and in smaller towns and suburban areas amounted to 16.7% and 15.4% respectively. A certain level of diversity, however, may be noted among the EU-27 countries. An example may be Poland, where the biggest overcrowding rate is noted in rural areas (slightly over 40%) and large cities (nearly 40%), whereas it is lower (between 36 and 37%) in smaller towns and the suburbs.

One of the contemporary indicators used when assessing the qualitative aspect of housing economy is the inability to maintain flats sufficiently heated, which is a sign of energy poverty. As the Eurostat data show, approximately 7.6% of the EU-27 population in 2018 could not afford to keep their home sufficiently heated. Among the people at risk of poverty, this share was 2.5 times higher (19.0%). What is important, however, is the fact that on average 23.57% of the Central and Eastern European population is exposed to hidden energy poverty (Karpińska & Śmiech 2020). The problem is exacerbated by infrastructural problems, income inequality, energy insufficiency and deficiencies typical of post-socialist economies (Bouzarovski 2014). In Poland, this indicator gradually decreased from 2013 to 2018, both in the population in general and in the population at risk of poverty, which may result from the undertaken thermal efficiency investments funded from the Thermal Efficiency and Renovation Fund operating with Bank Gospodarstwa Krajowego, a state development bank in Poland.

Interviews (in 92 households) with dwellers of council flats in Poznań were carried out in 8 housing estates in 2010-2018. The buildings initially select-

ed for the research (in 2010) were mostly (6 out of 8) relatively new or completely renovated. 52 interviews were carried out in 2010 and 2011, whereas in 2012, 2014, 2016 and 2018 ten interviews (per year) were carried out to refresh the information collected and assess the life situation of the respondents who agreed to continue to participate in the research. Despite the lapse of time, among the respondents who continued to participate in the research, the housing situation did not change a lot. 8 out of 10 respondents still lived in council premises, while 2 became independent. During the research in all years, the respondents pointed to a small metric area of the dwellings and low number of rooms (2 rooms and 45 sq. m on average) which led to overcrowding, which was the main cause of dissatisfaction with the dwelling occupied and the emphasis to be willing to change the dwelling to another, bigger one (69% of the respondents).

The respondents were also asked about their subjective judgement of the dwellings. They saw many positive qualities of the occupied dwellings. Rated highest were the qualities related to the location of the building in which the dwelling was situated, the proximity of green areas, having a garden or a terrace. Furthermore, the respondents pointed to the following as important advantages: access to central heating, hot water, a peaceful area and being far from the city centre. As negative, the following were named: defects and lack of action of the City Council to remove them. It was underlined that they were an effect of using finishing materials of poor quality. Additionally, the respondents said the negative perception of the dwelling was affected by noise, the district in which the dwelling was located, and its infrastructure: lack of benches, playing grounds, pavements or even rubbish bins.

The subjective indicators of satisfaction with the dwelling occupied, having impact on the quality of life as perceived by an individual, are also connected with the safety issues. More than 25% of the respondents saw their safety as good and said that it was safe at their estate. However, definitely more respondents were of the opposite opinion: more than 43% evaluated safety as poor, among others due to the neighbourhood, and quite a few respondents stated there was no safety at all. People who did not feel safe represented an older group of the respondents who were not accustomed to problematic or noisy neighbours. In general, the negative judgements of this problem may result from the fact that council flats are granted to families with various problems, including those with alcohol. The way of life of addicted individuals may not necessarily be accepted by the other dwellers of a council building, and thus lower their comfort of life and perception of safety.

The research conducted among the dwellers of council flats in Poznań allowed the authors to learn about the housing conditions of their dwellers and the problems arising from the situation found. The main problems of council housing include: an insufficient number of dwellings, overcrowding arising from the small metric area of the dwellings, lack of an intimate, private space

in the dwelling for each dweller, which is the consequence of the low number of rooms, insufficient furnishing of the dwellings with utility connections, especially in old buildings, problematic neighbours and partial lack of sense of safety.

Conclusions

The analysis carried out based on the statistical data revealed many problematic aspects of the public housing construction, showing the need to undertake new construction investment projects. The main problem is the insufficient supply of dwellings as compared to the reported needs, including those resulting from the existence of sub-standard dwellings. The level of unsatisfied housing needs among low-income households amounted to 1,772.61 thousand, taking into account also the sub-standard housing source. One of the institutional aspects affecting negatively the situation in the segment of social flats is that households which signed a tenancy agreement for indefinite term block municipal premises and use them despite the fact that their financial situation has improved. During the analysis it was also observed that the standard of the housing stock is improving, which materially affects the improvement of conditions and quality of life both of the current and potential, future users of the dwellings. These changes, however, are insufficient in the face of the significant shortage of this type of dwellings in general.

Based on the analysis of the statistical data and the relevant literature, the following conclusion may be drawn:

– the most important problem affecting the low quality of life in social housing is the insufficient supply of social dwellings as compared to the needs reported, especially among the most impoverished households.

Detailed conclusions regard the following problem areas:

– the standard of the social housing stock is getting better; however, many dwellings are still sub-standard (1,333.9 thousand);
– improvement in the effectiveness of addressing the housing needs of low-income households would require to increase public spending, which currently is possible only within the limits of the financial capacity of the state and the particular municipalities; the result is that chances to achieve significant effects in the next years are scarce; it should be expected and strived for, however, for sensitive groups (people with disabilities, large families, single parents, seniors) to be granted with a guarantee of access to housing.

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Young customers' expectations in terms of implementing PropTech (Property Technology) on the local primary residential market in Poland[1]

Anna Górska
Poznań University of Economics and Business
https://orcid.org/0000-0002-0536-8475; anna.gorska@ue.poznan.pl

Anna Mazurczak
Poznań University of Economics and Business
https://orcid.org/0000-0003-0311-1884; anna.mazurczak@ue.poznan.pl

Łukasz Strączkowski
Poznań University of Economics and Business
https://orcid.org/0000-0002-5555-5324 , lukasz.straczkowski@ue.poznan.pl

Abstract: The real estate market is considered to be one of the least technologically advanced markets. Despite this, attempts are made to implement modern technologies referred to as Prop-Tech. The aim of this study is to assess customers' expectations in the use of modern technologies in the process of buying and subsequent use of flats on the local primary residential real estate market.

The study has been conducted in order to achieve the above-mentioned goal. A survey questionnaire was used as a research tool. The subjects were young people (up to 35 years of age) from the area of Poznań (non-random sample selection, sample size n=220). Based on the research, it can be concluded that there is a large group of customers that are aware of modern technologies and claim that they would be willing to pay more for the technologies they choose. Probably this number could be increased if the buyers were pointed to specific savings from investing in modern solutions.

The adopted spatial scope (city of Poznań) results from the specificity of this research area. And although there are no substantive grounds for major generalisations, taking into account the size of the market in Poznań, it can be assumed that in other large Polish cities customer preferences are similar.

Keywords: residential real estate market, PropTech, preferences of customers.

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Introduction

The real estate industry is currently undergoing a digital transformation that is not only changing its nature, but also contributing to its growth. This transformation is the result of a phenomenon known as PropTech, which is characterised by the massive implementation of emerging technologies such as drones, virtual reality, building information modelling (BIM), data analysis tools, artificial intelligence (AI), Internet of Things (IoT) and blockchain, smart contracts, crowdfunding in real estate, smart city, smart home or the sharing economy (Siniak, Kauko, Shavrov, Marina, 2020). Unfortunately, digital and information technologies on the real estate market are introduced late, but they still constitute an important element of innovation of entities in the field of online brokerage and sales, space commercialisation, handling the development process and the use of FinTech in mortgage and equity financing.

Research within PropTech is becoming an increasing challenge and a necessity for the Polish real estate market. This is due to the fact that not only investors, but also developers, tenants, managers and real estate brokers are involved in the PropTech revolution (Cushman&Weakefield, 2021). The leaders in this regard are the United States and China. It is admitted, however, that countries such as Spain, Finland and Poland may be important players in this sector (Tagliaro, Bellintani, Ciaramella, 2021).

However, it is a common view that there is still no systematic PropTech analysis on a global scale, but also at the level of local real estate markets, including Poland. Moreover, the experiences of various countries in this field remain insufficiently researched, since the scientific debate on PropTech has taken place only recently. Taking up the topic of PropTech on the local real estate market is aimed at joining the discussion in this area and determining the possibilities of absorption of new technologies in Polish conditions. The areas of primary residential market and preferences of customers were selected for the analysis. The importance of knowledge about modern technologies in the development industry is of interest on many local markets. Maududy and Gamal (2019) emphasise that failure to use the available PropTech technologies can lead to lower sales, a decline in competitive position, and eventually exit from the market. For this reason, identifying the needs of potential customers seems crucial for developers as providers of new housing.

1. Literature review

According to the CBRE report (2021), AI, Big Data and IoT are the main technologies used by PropTech that are changing the real estate sector, which is in the phase of advanced technological transformation. Innovation and digitisation serve to search for solutions that will increase efficiency and create new

business models. Sensory and IoT offer a wide range of possibilities by generating millions of data on any resource that can be used with technologies such as artificial intelligence or machine learning, which was much more complicated just a few years ago. In addition, the COVID-19 pandemic has accelerated other trends such as virtual and augmented reality that became very important during lockdowns, allowing remote resource insight, and Blockchain or BIM, more advanced and cutting edge technologies.

Technology is at the heart of major business and real estate trends. This includes hybrid work, health and safety, and sustainability initiatives, all of which are in high demand (JLL, 2021). Nearly 8,000 JLL-identified companies that deliver technology solutions in the construction environment have raised over $ 97 billion in total equity financing over the past decade. Embedded environment technology start-ups can now be found in most countries around the world.

There are various definitions of the term PropTech. Generally, this concept is a combination of two words "property" and "technology". Shaw (2018) views PropTech as the sum of digital platforms that connect different real estate stakeholders. Rather than classifying digital real estate platforms, Shaw (2018) categorised stakeholders into four clusters and presented their interrelationships to facilitate different PropTech applications. "FinTech" and "ConTech" refer to technological applications in the financial and construction sectors, but are often difficult to distinguish from PropTech (Mauddy, Gamal, 2019). PropTech has also been defined by the Royal Institution of Chartered Surveyors (2018) and addresses all aspects of technology and its impact on built-up properties, including software, hardware, materials or the development process itself. Furthermore, according to RICS (2018), the term PropTech is often overused and should refer to small start-ups that use technology to solve market problems. The companies that make this move are also called PropTech and are mostly start-ups (Hasenmaile, Rieder, 2017; Mauddy, Gamal, 2019) even though many small and medium-sized enterprises (SMEs) and corporations also play a significant role in introducing technology in the real estate sector (Baum, 2017). The social engineering aspect is also emphasised in PropTech terminology. The concept of Shaw's (2018) platforms is largely based on the essence of network infrastructure as an opportunity to create additional network effects and interactions.

Baum (2017) defines three PropTech sectors: smart real estate, shared economy and FinTech. Smart Real Estate includes technology-based platforms that facilitate the operation and management of real estate. Platforms can provide information on the performance of buildings or urban centres, or they can directly facilitate or control construction services. This sector supports real estate management (Baum, 2017). The shared economy describes technology-based platforms that facilitate the use of real estate assets. Assets can be land or buildings, including offices, shops, warehouses, flats and other types of real estate. Platforms can simply provide information to potential users and space sellers, or they can more directly facilitate or conduct rent or fee-based

transactions. This sector supports the real estate tenant markets. Real Estate FinTech describes technology-based platforms that facilitate real estate trading. Assets can be buildings, stocks or funds, debt or equity; property may be owned or leased. Platforms can simply provide information to prospective buyers and sellers, or they can more directly facilitate or carry out asset or lease ownership transactions with a (negative or positive) capital value. This sector supports real estate capital markets.

According to Baum (2017) three basic phases of the evolution of modern technologies in the real estate sector can be distinguished (Table 1).

Table 1. Evolution of PropTech

Phase	Sources and Features
PropTech 1.0	– the first wave of PropTech in 1980-2000 took place mainly in the US and UK. – the development of real estate indirect investment vehicles, debt and asset based securitisation, the development of REITs and the derivatives market - all of these changes required a much more quantified and research-driven approach to performance measurement and investment strategy; – The rapid globalisation of the real estate industry in terms of investors, capital sources and advisory services has significantly diminished the local nature of the industry and increased demand for a more research-driven product. – the increasing availability of data allowed for effective quantitative modelling, and valuation software, property and portfolio management systems became computer and technology based, – Excel has become an indispensable real estate tool.
PropTech 2.0	– PropTech 2.0 continues PropTech 1.0 focuses on residential real estate as a homogeneous type of real estate assets with more public information (prices and rents), – the FinTech industry - in particular online payment systems, crowdfunding, equity and debt platforms as well as online exchanges - is the basis of a large part of the PropTech 2.0 revolution, – the online housing sector (e.g. AirBnB) seems to be the bridge between PropTech 1.0 and PropTech 2.0
PropTech 3.0	– the most technologically advanced wave of PropTech, defined in 2017 at the Oxford University School of Business in Great Britain. – blockchain, big data, artificial intelligence (AI), internet of things (IoT), cloud computing and software as a service (SaaS), drones and 3D scanning, virtual reality (VR) and augmented reality (AR)

Source: Own study based on (Baum, 2017).

An important element of the technological revolution in the real estate sector is FinTech. In the 2015 report of the World Economic Forum, The Future of FinTech (developed in collaboration with Saïd Business School at the University of Oxford) FinTech was defined as the use of technology and innovative business

models in financial services. On the other hand, a report by KPMG (2018) and CB Insights The Pulse of Fintech (2016) suggests that although FinTech covers a diverse range of companies, business models and technologies, companies are generally divided into several key industries (industry sectors), including Lending tech, Payments/billing tech, Personal finance/wealth management, Money transfer/remittance, Blockchain/bitcoin, Institutional/capital markets tech, Equity crowdfunding, InsurTech.

FinTech can be seen as a very good guide to where a large proportion of PropTech activities will go. All of the above categories are for real estate and there are examples of PropTech companies operating in all of these industries. PropTech is not a subset of FinTech. For example, a technology designed to make a building intelligent by collecting and analysing data and reacting with controls is not FinTech. PropTech and FinTech are to be separate groups, sharing a single overlay, which is Real Estate FinTech. Smart buildings (or more generally smart real estate) and the shared economy are examples of non-FinTech PropTech sectors (Figure 1).

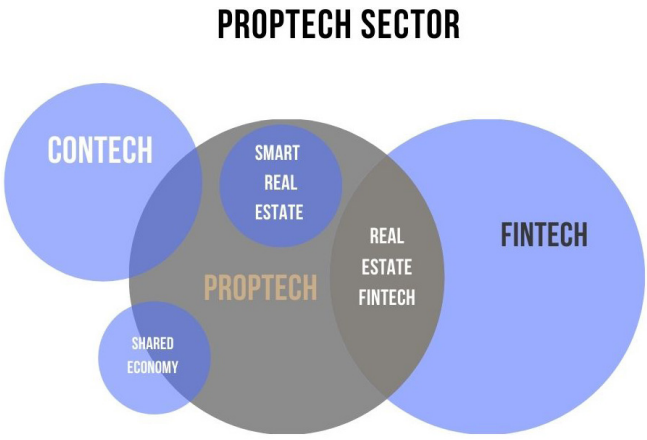

Figure 1. PropTech sector
Source: (Baum, 2017).

There are several PropTech classifications in literature and practice, which are mainly due to the following criteria (Tagliaro, Bellintani, Ciaramella, 2021):

- implemented technology that can be distinguished in evolutionary stages, such as Proptech 1.0, 2.0 and 3.0 (JLL, 2021; Baum, 2017);
- a supply/value chain or development process that is broken down into the following stages: (1) pre-construction, (2) construction and (3) as-built (Maududy, Gamal, 2019);
- factors such as information, transaction/market and management/control (Baum, 2017) or production, construction and operation, management and marketing, and transaction (Gamal, Maududy, 2019);

– the stakeholders involved, which can be divided into four main market segments, namely investment activity, commercial market, building management and residential market (Shaw, 2018).

Another classification of PropTech segments is proposed by MIPIM, divided into: smart buildings/IoT (internet of things), smart city sustainability, market place, crowdfunding, ConTech, 3D/VR (virtual reality), data and research analytics. Additionally, Venture Scanner says it tracks more than eleven hundreds of real estate technology companies in 12 categories, with a combined funding of nearly $ 30 billion. Within PropTech, you can also categorise activities and services in a variety of ways. Baum and Dearsley (2021) points to: e.g. big data, software providers, lending/crowdfunding, news/advice, Lending: peer-to-peer, virtual and augmented reality, property management, lending—mortgages, co-working, internet of things, online agent—brokerage, online agent—sales, online agent—lettings, payment operations, blockchain, artificial intelligence (AI), accelerators and VCs.

3. Methodology

The following goals were adopted in the research undertaken in the field of modern technologies on the local residential real estate market:

C1: identifying the sources that are taken into account in the process of acquiring a flat,
C2: indicating the key elements that should be on the developers' website,
C3: identifying new technologies that young people take into account in searching for their target premises,
C4: presenting young people's views on modern technologies.

It was decided that in order to achieve them, a survey should be conducted among mainly young people—the methodological assumptions are presented in Table 2. It should be added that the main group of respondents to whom the questionnaire was addressed were young people, most often defined as those whose maximum age does not exceed 35 (Kusińska, 2005). This intention was not accidental. This is because, according to the research, in the structure of flat buyers, it is the young that constitute the largest percentage (see Strączkowski, 2021; NAR, 2017; NAR, 2029). Their decisions and housing choices are influenced by key life moments, such as: leaving the family home, employment, marriage, having children (Finlay, Pereira, Fryer-Smith, Charlton, Roberts-Hughes, 2012; Wu, 2010). Besides, the generation of young people is unique, not to say revolutionary, when it comes to market behaviour. No other user group changes so quickly in terms of needs and behaviour. They use digital tools without restrictions or inhibitions—over 90% of the people from this group, when looking for a flat, access information via the Internet (Chimczak, 2017; Kaya, Ozdemir, Dal, 2019). Thus, like no other generation, they are ex-

ceptionally open to the use of modern technologies, including the residential real estate market.

The ability to reach respondents was also of key importance. Originally, the collection of data was to take place using two channels, i.e. through: (1) an au-

Table 2. Basic information on research in the field of modern technologies on the local residential real estate market

Specification	Description
Information gathering time	4 months - from May to August 2021 The time spent collecting data took into account problems that arose due to the COVID-19 pandemic.
The spatial scope of the study	the local residential real estate market in Poznań The housing market has a local character (each is different, which is due to the characteristics of the real estate market), which has already been proven in many scientific studies, both domestic and foreign (Schmitz and Brett, 2001, pp. 3-18; Stefaniak, 1997, p. 33; Bryx, 2013, p. 190; Kucharska-Stasiak, 2016, p. 59; Belniak, 2001, p. 42; Strączkowski, 2021, p. 39).
Material scope of the study	research subject: mainly young people (up to 35 years of age) the purpose of this research was to take into account young people as a group most frequently purchasing apartments, especially on the primary market. Such research subject was also adopted due to greater openness to modern technologies. The generation of young people is unique, not to say revolutionary, in terms of market behavior. No other group of users in the housing market is changing so rapidly in terms of needs and behavior, and the reason is the dynamics of changes in the environment, including technological progress, which changes the behavior of the young generation, the approach to habitation (Chimczak 2017, p. 32). The generation of the so-called Millennials is looking for different content in the products offered to them. Like no generation before, without restrictions and inhibitions, they use digital tools—more than 90% of the people in this group, looking for housing, reach information through the Internet (Kaya, Ozdemir, Dal, 2019). the subject of the study: sources of information about flats, information important for potential buyers, which should be on developers' websites, new technologies that can be taken into account when purchasing flats, views on modern technologies in the place of residence
Time range of the study	coincides with the time the information was collected
Research tool	internet survey questionnaire The authors originally planned to conduct a face-to-face survey but due to pandemic constraints it was not possible to reach respondents directly.
Selection and size of the sample	sampling non-random, purposeful, sample size n = 220 units

Source: Own study.

ditorium survey and (2) an online survey. Due to the outbreak of the COVD-19 pandemic and limitations in social contacts, collecting data using an auditorium survey turned out to be impossible and, consequently, the first channel was abandoned. Ultimately, we managed to reach 220 respondents, among whom:

- 53% were women, the rest—men;
- the percentage of people aged up to 25 was 64%, and those aged 26-35 - 24%. The rest of the respondents were older (the oldest respondent was 58 years old). Thus, the average age of the respondent was 27, and the median was 24;
- the relatively largest group of people (47%) plan to create a family with two children, 17%—with one child. Every fifth respondent (22%) did not intend to have children, and every seventh (15%)—three or more children;
- the largest group were those respondents who would like to buy a flat located in a block of flats, in a housing estate (49%). A fairly large percentage also indicated a desire to buy a detached house (42%). The remaining people declared their intention to buy a flat in a terraced house or a semi-detached one;
- the expected average budget for the purchase of a flat reaches the level of PLN 482 thousand. PLN (median at the level of PLN 450 thousand).

4. Results and discussion

The first of the examined issues was related to the possibilities of obtaining information. As you know, these can be obtained from various places and from many entities, including people professionally related to the real estate market, but also from friends or family. The respondents were asked to indicate three

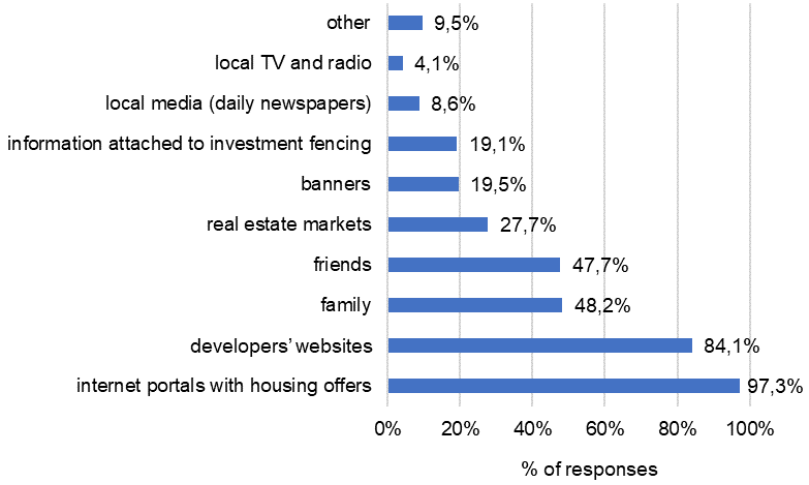

Figure 2. The most popular sources of information about housing
Source: Own study.

sources of information that they would use in the search for their flat. The results of their indications are shown in Figure 2.

It turned out that the first position was taken by internet portals with housing offers (97%), which present information on both the premises and entire investments. The second place—out of 84% of responses—was taken by developers' websites, where you can find not only the previously presented news, but also often their experience and housing projects completed so far. This means that the digital tool—the internet, is of primary importance in the search for housing, as the first two sources together cover 181% of responses.

The following places seem to confirm the importance of the human factor. It turns out that people whom we see often or even on a daily basis play an important role in the search. It is about the closest family and friends (in both cases, almost 48% of responses). Finally, other sources take further places, including: housing fairs, banners, or information that is presented on investment fences or in local media (television, radio, daily newspapers).

The respondents also indicated other sources, referred to as "other". According to the answers provided, information can also be provided by: magazines (in which you can find apartment sales offers), leaflets (e.g. dropped into mailboxes), billboards, real estate agents, housing cooperatives (advertisements), groups created on social networks (e.g. Facebook).

The results presented above were basically in line with the expectations. By assumption, today's internet allows for quick access to information about housing investments, comparing (also at home) various housing projects as well as the initial selection and selection of places and premises that are of particular interest to the customer. For this to be the case, the developers' websites should contain such data that would actually allow the potential customer to meet their information needs. For this reason, the next question concerned those elements that should be on the developer's website. The respondents gave graded answers on a five-point scale (from 1—not important, to 5—important).

According to research on the preferences of flat buyers, the key role in making a decision to buy a flat is assigned to its price (Strączkowski, 2021). Probably for this reason, the most important element of the developer's website should be the ability to check housing prices—the respondents' answers gave an average of 4.89 points (91% of respondents stated that it is important for them)—see Table 3. Among the other elements, forming the so-called The top 5 of the most important ones include the following: information on the availability of individual flats (the average was 4.78 points), the possibility to see projections of flats (4.75), visualisation of the investment (4.41) and information about the investment environment (4.38). It is worth noting that these are elements that can be described as traditional. They are not a new addition to websites, although of course the information the customer needs can be presented in a more modern, attractive way. In turn, those elements that can be considered more technically advanced appear in further places—e.g. those

Table 3. Important elements for the Customer that should be on the developer's website

No.	specification	mean (points)	structure of responses (%)				
			unimportant	rather unimportant	indifferent	rather important	important
1	ability to check prices of flats	4.89	0.0	0.5	0.9	8.2	90.5
2	information about availability of individual flats	4.78	0.5	0.0	0.5	19.5	79.5
3	possibility to see projections of flats	4.75	0.5	0.5	2.7	16.4	80.0
4	investment visualisation	4.41	1.4	0.5	8.7	35.2	54.3
5	information about investment environment	4.38	0.9	2.3	5.5	40.9	50.5
6	visualisations of individual flats	4.16	1.4	3.6	15.9	35.5	43.6
7	apartment search engine	4.04	0.5	5.9	17.3	41.8	34.5
8	interactive building plans	3.61	2.7	7.7	29.5	45.5	14.5
9	ability to send emails via contact form	3.55	3.6	12.3	30.5	33.2	20.5
10	possibility of taking a virtual walk	3.53	6.4	6.4	32.7	37.3	17.3
11	interactive location map	3.46	5.5	8.6	34.5	37.3	14.1
12	virtual arrangement of space	3.36	5.5	11.4	36.4	35.0	11.8
13	possibility of filling in a short questionnaire and selecting the flat to needs	3.36	9.5	13.2	25.5	35.5	16.4
14	possibility of online meeting with flat sellers	3.35	5.5	15.9	30.0	35.9	12.7
15	photos from the progress of works on the construction site	3.28	7.3	15.9	32.7	29.5	14.5
16	social media links (Instagram, Facebook, Twitter)	3.10	12.7	14.1	37.7	21.8	13.6
17	transition from website to mobile application	2.99	12.7	21.8	30.5	23.6	11.4
18	QR code enabling quick access to selected parts of the offer	2.61	18.2	25.5	38.6	12.3	5.5
19	chat bots	2.46	27.3	24.5	27.7	15.9	4.5
20	direct video transmission from the construction site	2.29	30.0	24.1	35.9	6.8	3.2

Source: Own study.

that are based on interactivity (location map, projections, on-line meetings with sellers) or on the use of virtual solutions (walks around the building, arrangement of space), obtained average marks at a level lower than 4 points. This means that, in the opinion of the respondents, their existence is indifferent or of little importance. Among the latter, the following elements can be distinguished: a QR code enabling quick access to selected parts of the offer (average at the level of 2.61 points), chat bots (2.46) and direct video transmission from the construction site (2.29).

As modern housing construction allows the application of various modern technologies, the respondents were asked about the ones that would be most important for them when choosing a flat, and each of the respondents had the opportunity to indicate up to 5, in their opinion, most important. The list of possibilities was created on the basis of consultations, thanks to which the ones that can realistically be introduced into today's offer of flats for sale were specified. The election results are presented in Figure 3.

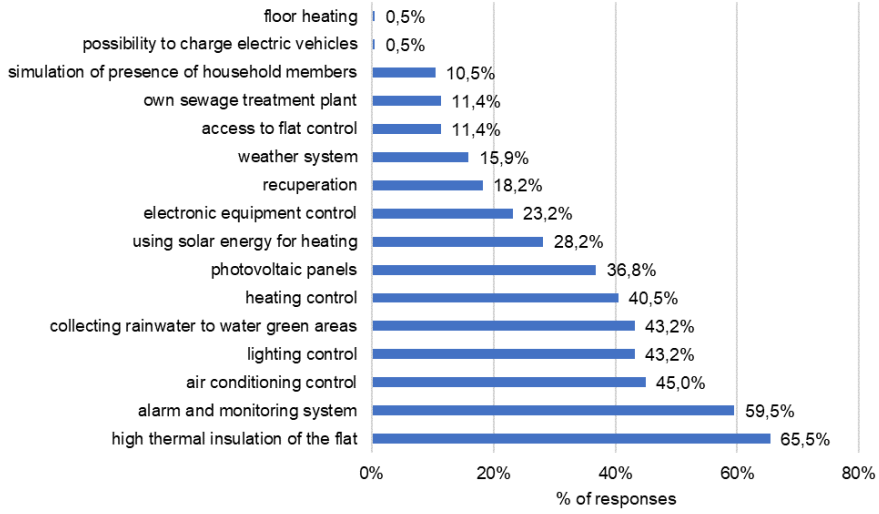

Figure 3. Technologies taken into account when looking for a flat
Source: Own study.

The following issues attract attention:

1. the highest percentage of responses concerned the issue related to the thermal insulation of a flat (66%). Such a result may be a consequence of the promotion and implementation of wide-ranging thermo-modernisation activities, observed, for example, in housing cooperatives with resources built before 1989;
2. quite a large percentage of indications is recorded for technologies that allow electronic control of various functionalities (e.g. air conditioning con-

trol—45%, lighting—43% or heating—41%). On the one hand, it is believed that this is the result of the widespread use of electronic devices, mainly smartphones, which, thanks to applications, make it relatively easy to control specific areas. On the other hand, the possibility of simple control of these areas seems to make life easier for young people, but also to stand out and treat this element as increasing value in the eyes of friends;

3. a relatively smaller percentage of indications concerns issues related to water and sewage. While 43% is related to collecting rainwater for watering green areas, only 11% of the respondents' votes refer to their own sewage treatment plant;
4. the respondents show few answers when it comes to connecting the place of residence with the use of electric vehicles (cars, bicycles or scooters). The possibility of charging electric vehicles received only less than a percentage of indications.

In relation to the above, it is interesting to look at the budget that is planned for the purchase of a flat, and more importantly—what percentage in relation to the price of the flat the respondents would be willing to pay more in connection with the modern technologies used.

In the case of spending on the purchase of a flat, more than half of the respondents (54%) predict that the amount they will allocate for this purpose will not exceed PLN 450,000. Almost every fifth person (19%) estimates that they can pay the price between PLN 450 and 500 thousand, and every fourth (26%) that even more than PLN 550 thousand. However, when it comes to the percentage of the price of the flat they would be willing to pay to have modern solutions in their home, 41% of the respondents (the largest group) indicated that they would accept the maximum level of 5% of the flat price, a further 31%—from 6 to 10% of the flat price, and 23%—up to 20% of the flat price. All the answers allowed estimating the level of acceptable expenses for new technologies at 11% of the price of a flat (median 10%).

The use of modern technologies in flats must be connected with convincing the users of the premises about the safety and the rightness of their use. In order to spread, these solutions must win people's trust and convince them that they can be important in reducing the cost of living, as well as positively influencing the natural environment (rational management of resources). In order to check the opinions about modern technologies the respondents expressed, their attitude towards them was assessed (the results are presented in Table 4).

When it comes to the general feeling of modern technology, it seems to be positive in young people. This is evidenced by the results obtained. The vast majority of the respondents (78% in total) noticed that they agree to a greater or lesser extent with the statement that modern technologies reduce the cost of maintaining a flat. Only 8% of the respondents were of the opposite opinion. Importantly, 83% of people claimed that they would be willing to pay more for the technologies they choose. Probably this percentage could

Table 4. Opinions of respondents about modern technologies used in housing construction

specification	mean (points)	structure of responses (%)				
		no	rather no	neither no nor yes	rather yes	yes
The indicated technologies cause a reduction of the cost of maintaining the flat	4.06	1.4	6.8	14.1	40.0	37.7
The presence of modern technologies in investments causes greater interest in a given housing offer	4.00	2.3	4.1	12.7	53.2	27.7
When I buy a flat, I will be willing to pay more for the technologies I choose	3.90	2.7	6.8	7.3	64.5	18.6
The use of modern technologies makes me feel safer in my flat	3.84	2.7	6.4	22.7	40.9	27.3
The use of modern technologies gives me a sense of fulfilling responsibility for the natural environment	3.68	6.4	7.3	19.5	45.5	21.4
The use of modern technologies in the environment gives me a sense of prestige and recognition from other people	3.56	7.3	12.3	19.5	39.1	21.8
The use of modern technologies causes a feeling of being controlled	2.47	22.7	31.4	28.6	10.9	6.4

Source: Own study.

be increased if the buyers were pointed to specific savings from investing in modern solutions.

It was further observed that over 80% of them believe that the presence of modern technologies in investments causes greater interest in a given housing offer. Therefore, it can be used by developers as a competitive advantage on the market. Moreover, the respondents agreed that the use of modern technologies makes them feel responsible for the natural environment (67% in total). Thus, it has a pro-ecological dimension. For 61%, the use of modern flats, i.e. those equipped with specific amenities, creates a sense of prestige and recognition from the environment. For 68%, it gives a sense of security.

During the consultation stage of the questionnaire, it was noted that for some people, the use of modern technologies may cause discomfort and a sense

of being controlled. In the case of the conducted research, the percentage of respondents pointing to this problem reached the level of 17% (almost every fifth person). 54% of respondents were of the opposite opinion, while 29% had ambivalent feelings in this regard.

Conclusions

Summarising the above results, the following research conclusions can be formulated:

- identifying the sources that are taken into account in the process of acquiring a flat:
  - today's internet allows for quick access to information about housing investments, comparing (also at home) various housing projects as well as the initial selection and selection of places and premises that are of particular interest to the customer
  - the developers' websites should contain such data that would actually allow the potential customer to meet their information needs
- indicating the key elements that should be on the developers' website—the most important elements include the following: information on the availability of individual flats, the possibility to see projections of flats, visualisation of the investment and information about the investment environment
- identifying new technologies that young people take into account in searching for their target premises:
  - the highest percentage of responses concerned the issue related to the thermal insulation of a flat (66%)
  - quite a large percentage of indications is recorded for technologies that allow electronic control of various functionalities (e.g. air conditioning control—45%, lighting—43% or heating—41%)
  - a relatively smaller percentage of indications concerns issues related to water and sewage. While 43% is related to collecting rainwater for watering green areas, only 11% of the respondents' votes refer to their own sewage treatment plant
  - the respondents show few answers when it comes to connecting the place of residence with the use of electric vehicles (cars, bicycles or scooters)
- presenting young people's views on modern technologies:
  - the vast majority of the respondents (78% in total) noticed that they agree to a greater or lesser extent with the statement that modern technologies reduce the cost of maintaining a flat
  - 83% of people claimed that they would be willing to pay more for the technologies they choose
  - over 80% of them believe that the presence of modern technologies in investments causes greater interest in a given housing offer

- the respondents agreed that the use of modern technologies makes them feel responsible for the natural environment (67% in total).

The results of the above research can make an important contribution to the literature dealing with PropTech in Poland. As already mentioned, the national literature on the subject has not really dealt with this topic so far. Therefore, it can be considered that this study fills a research gap on the domestic market. At the same time, it is a voice in the international discussion in the PropTech area that has been going on for several years.

The local housing market is undergoing numerous changes, including changes in the use of modern technologies at the stage of design, implementation and use of residential facilities. These changes are dictated, in a large part, by the need for different groups of actors involved in the investment process to respond to the evolution of customer needs. The study points out the importance of analysing the preferences of housing buyers, which has not been previously considered in academic discussions. It is worth noting that it is the customers, especially on the housing market, who should be taken into account when setting directions and areas for the implementation of digital tools in property development investments.

The surveyed age group of customers under 35 is obviously one of the groups of customers who make purchases on the primary residential market. It is the most active and, at the same time, technologically aware group of buyers. The authors are aware of the need to encompass other age groups, including seniors. The above study is an initial work, and further stages include further research work in which other groups will be included.

Undoubtedly, an important aspect of the conducted research is the question of its usefulness for various groups of entities active on the housing market:

– developers—the need to tailor the offer to customers' needs. Adjusting the offer should not only include the basic characteristics of an apartment, such as size, number of rooms, etc., but also equipping the apartment with modern digital technologies to facilitate its use. This type of research can allow developers to increase their awareness of customers' expectations. Developers, who in recent years have been selling everything they could get their hands on, may not have noticed the changing needs of users precisely in the area of innovative techno-solutions
– housing market start-ups in the field of innovation in the design, implementation, sale and use of products of the development process
– researchers and academics, as a voice in the international discussion on the importance of PropTech on the local real estate markets, especially in the context of competitiveness of development entities.

Of course, there are significant research limitations including:

– the COVID-19 pandemic—difficulty in reaching respondents
– the local market, which may be a limitation since it is an example.

However, despite these limitations, the above study can provide a starting point for examining the sophistication of developers on local real estate markets, taking into account the needs and expectations of potential customers.

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Economic security of an industrial enterprise in competitive conditions

Alona Revko
Chernihiv Polytechnic National University, Ukraine
https://orcid.org/0000-0001-7888-3657; alohaha19@gmail.com

Svitlana Tulchynska
Technical University of Ukraine "Igor Sikorsky KyivPolytechnic Institute", Ukraine
https://orcid.org/0000-0002-1409-3848; tuha@ukr.net

Tetiana Tkachenko
National Technical University of Ukraine "Igor Sikorsky KyivPolytechnic Institute", Ukraine
https://orcid.org/0000-0002-2424-6123; tatvla@ukr. net

Abstract: The research is devoted to the issues of ensuring economic security of industrial enterprises in competitive conditions. The methodological basis of this study is a systematic approach that provides a holistic and functional vision of economic security of industrial enterprises in a competitive environment. It was found that the economic security of an industrial enterprise is a multifaceted, multi-vector concept, according to which the main emphasis is on the efficiency of all types of resources in the process of ensuring competitiveness of the industrial enterprise. The requirements for the functioning of economic security of an industrial enterprise are highlighted. The authors prove the necessity of observance of requirements on the maintenance of economic safety at the industrial enterprise in the conditions of competition, including: formation of system strategic measures concerning components of economic safety of the enterprise, development of industrial enterprise policies to create competitive advantages, use of information tools and digital technologies to monitor the risks and threats of an enterprise, etc.

Keywords: economic security, industrial enterprise, competitive conditions, competition.

Introduction

Modern resource imbalances, constant imbalances arising from the globalisation of economic development, systemic shifts in market conditions, rapid trends in technological change and other challenges require industrial enter-

prises to pay attention to economic security, which allows them to have a competitive position in the market. Industrial enterprises face the question of developing a system of economic security to maintain a competitive position in today's conditions of economic development. Due to the need to substantiate the methods of threat and risk assessment, management decisions are increasingly focused on ensuring the economic security of enterprises. This and other things determine the relevance of the study of economic security of industrial enterprises in a competitive environment.

The purpose of this study is to identify the principles of economic security of industrial enterprises in a competitive environment. To achieve this goal, the authors have identified and carried out the following tasks: highlighting the requirements for the functioning of economic security of an industrial enterprise, formalising approaches to the separation of constituent elements of economic security, outlining the requirements for ensuring economic security at an industrial enterprise in conditions of competition and allocating the direction of efforts of an industrial enterprise to maintain its economic development in competitive conditions.

1. Literature review

The problem of ensuring economic security of industrial enterprises has long been covered in scientific publications, which is among other things, due to globalisation processes that lead to increased competition among industrial enterprises on the market. It should be noted that ensuring economic security in terms of protection of stability of industrial enterprises has been considered by such scientists as: Arefieva O. (2021), Averichev I. (2014), Chornii V. (2021), Denisenko M. (2017), Illiashenko S. (2013), Ivchenko E. (2018), Kovalchuk A. (2020), Krutov V. (2008), Kuzenko T. (2004), Kychko I. (2021), Lyaskovets O. (2017), Melikhova T. (2018), Mizyuk V. (2008), Popelo O. (2014), Shkarlet S. (2007), Solosich O. (2020, 2021), Tulchinskyi R. (2021), Vovk O. (2021), Yarova Y. (2016) and others. Thus, Arefieva O. (2021) and Kuzenko T. (2004), researching the economic security of industrial enterprises, emphasise the complexity of this concept, due to a combination of foreign economic factors and the internal structure of resources and processes in an enterprise, which are activated when a threatening situation occurs alongside the necessity to protect the enterprise and its competitive position on the market.

Formalising approaches to economic security, Scarlet S. (2007) focused on identifying the nature of the relationship of production and organisational structure provided by resource systems, information flows and innovative opportunities to ensure the stability of industrial enterprises. Ilyashenko S. (2013) emphasises the need to neutralise negative effects of the environment, which is the main determinant of the effectiveness of economic security of industrial enterprises.

Modern economic challenges of economic development are constantly exacerbating competitive conditions, which increases the relevance of research to ensure economic security of industrial enterprises. These and other reasons determine further scientific research in this direction.

2. Methodology

The methodological basis of this study is a systematic approach that provides a holistic and functional vision of economic security of industrial enterprises in a competitive environment. Additionally, both general and specific scientific methods of research have been used, including: a) induction and deduction—for objective research and identification of the principles of economic security of industrial enterprises in competitive conditions, b) analysis and synthesis—to identify trends in economic security in modern conditions of increasing competition, taking into account the specifics of the industrial direction of enterprises, c) monographic studies—for the selected direction of the efforts of an industrial enterprise to ensure its economic development in competitive conditions and d) generalisation—to form proposals based on the grouping of industrial enterprise requests for the functioning of economic security, as well as to present approaches to the separation of components and requirements for the functioning of economic security of industrial enterprises.

3. Results and discussion

Economic security of an industrial enterprise is a multifaceted, multi-vector concept, according to which the main emphasis is placed on the efficiency of all types of resources in the process of ensuring competitiveness of an enterprise. The efficient use of enterprise resources involves rational distribution of costs in relation to production and financial activities, as well as focus on strategic development. This makes it possible to achieve stability and balance of an industrial enterprise and its competitive position on the market. Modern economic changes necessitate separation of the principles of economic security of industrial enterprises in a competitive environment, as it makes it possible to focus efforts on economic security management and further strategic development of industrial enterprises in competitive conditions.

Investigating economic security of an industrial enterprise is impossible without using a systematic approach. Because both the enterprise itself and its economic security are systemic in nature, interconnected with the environment, they act as subsystems of the highest levels. Economic security affects the effective functioning of an enterprise and ensures the achievement of development goals in a competitive environment. Therefore, for economic

security, as well as any other system, the requirements for its functioning are important. Such requirements for the functioning of economic security of an industrial enterprise include:

- balance of the structure, which is determined by the balance between the distribution of resources and functions. A resource-intensive economic security system depends on the purposefulness of the impact on minimising threats and risks, as well as strategic planning of industrial enterprise development in competitive conditions
- efficiency of attracting resources, which follows from the main mission of creating economic security at an enterprise
- focus on a certain level of risk tolerance to ensure economic development of industrial enterprises
- priority in determining the direction of the impact of economic security on a particular functional component.

Economic security of an industrial enterprise has an extensive system of constituent elements, which may differ depending on the specifics of the industrial enterprise, the competitive position of the enterprise and competition on the market. Most often, the components of economic security of an industrial enterprise include financial, technical, personnel, information, legal, innovation and security. In addition, this list of components of economic security can be expanded to include social, cultural, foreign economic, corporate, criminal, investment and other components. This number of the main components of economic security, on the one hand, makes it possible to cover more widely the direction of economic security of an industrial enterprise, and on the other—can be the cause of distraction. In such circumstances, it is important to ensure economic security of an industrial enterprise in a competitive environment and to adhere to a formalised approach to identify the components of economic security.

Such formalised approaches to the separation of components of economic security can include:

- resource, which provides a classification by the type of enterprise resources and determines the established criteria for their availability or the possibility of obtaining resources for the security of an enterprise (the list of resources may include financial, human, intellectual, informational, technical, technological, investment, infrastructure and other resources);
- sectoral, each industrial enterprise has an important area of activity, which in itself may have different indicators of development security of enterprises in a particular industry (separation by areas of activity, such as industry, energy, transport and business);
- functional, depending on the functionalities of economic security implemented at an enterprise to ensure the design level of security (such functionalities may include economic, social, environmental development, information, financial, investment, personnel, organisational, legal protection of an enterprise in competitive conditions);

– managerial, which ensures directing economic security towards minimising threats to economic development (concerns the areas of managerial influence on the market, technological, innovation, physical and other areas);
– factor, according to the classification of factors for ensuring economic security of industrial enterprises and the types of risks and threats to the operation of an enterprise in competitive conditions (economic and functional impact, technological, environmental, political, globalisation and other impacts). (Figure 1):

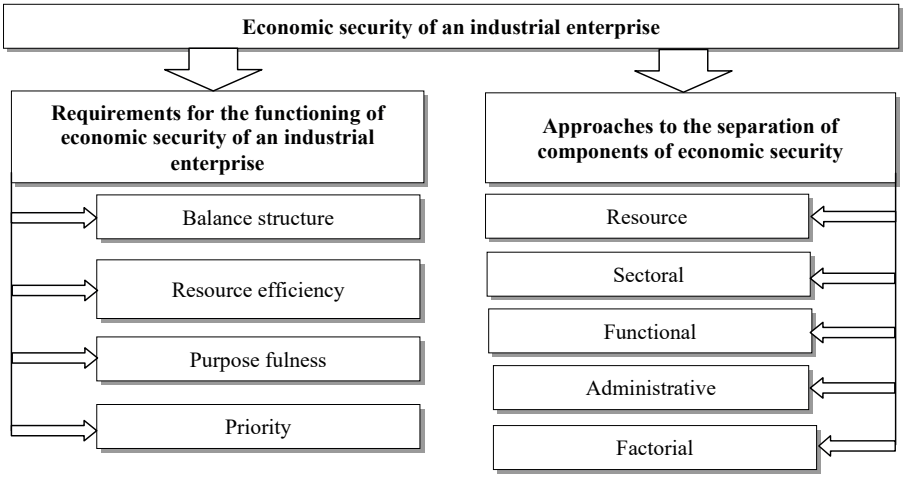

Figure 1. Approaches to the separation of components and requirements for the functioning of economic security of an industrial enterprise
Source: Created by the authors.

The efficiency of economic security of an enterprise involves achieving a level of functioning of the enterprise in a competitive environment, in which all resources are used so productively that it provides greater profitability of the enterprise than competitors. Such efficiency involves providing not only advantages in the cost of products made by the enterprise, but also the use of innovative, informational and other technologies that enable the company to ensure price stability or cover other threats to the operation of the enterprise.

Ensuring the economic security of an industrial enterprise increases its competitiveness on the market, as well as profitability. This situation implies the occupation of the enterprise in a competitive environment with relatively stable positions. This and other conditions determine the following requirements for ensuring economic security in an industrial enterprise in conditions of competition:

– formation of systemic, strategic measures for the components of economic security of an enterprise;

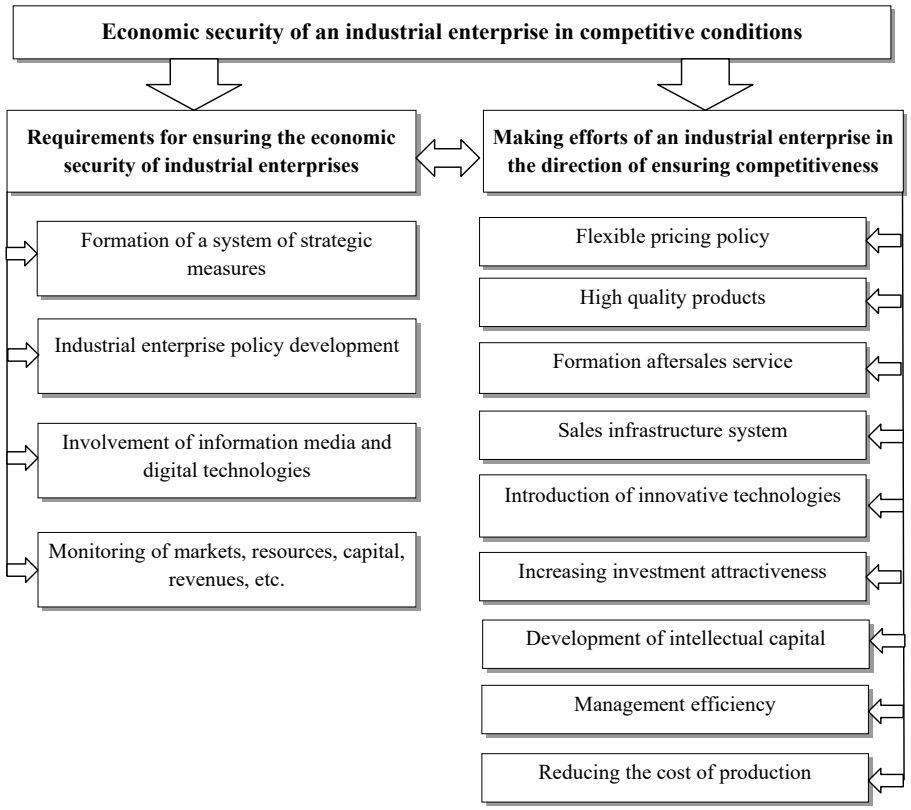

Figure 2. Economic security of an industrial enterprise in competitive conditions
Source: Created by the authors.

– development of policies of an industrial enterprise on creation of competitive advantages at the expense of innovative development and attraction of investment resources;
– use of information tools and digital technologies to monitor the risks and threats of an enterprise in the direction of ensuring the competitive position of the enterprise on the market;
– monitoring, which includes a general analysis of markets for resources, products, capital, financial and pricing policies, market conditions, income stability (Figure 2).

Thus, the separation of requirements for the functioning of economic security of industrial enterprises, clarification of the approaches to the separation of components of economic security and requirements to it allow the direction of efforts of industrial enterprises to ensure their economic development in competitive conditions, including:
– flexible pricing and tariff policy
– high quality of manufactured industrial products

- formation of the system after the sales service, which will improve the image of the enterprise
- setting up a sales infrastructure system
- active introduction of innovative technologies and adjustment of production of innovative products
- increasing investment attractiveness
- development and capitalisation of intellectual capital of the enterprise;
- ensuring environmental safety in accordance with the principles of sustainable development and functioning of the circular economy;
- the effectiveness of the organisational management system of an industrial enterprise;
- finding sources to reduce the cost of industrial products at specified standards and standards of safety and product quality;
- expansion of production capacity in the presence of demand for products;
- entering the international market;
- modernisation and renewal of fixed assets at the enterprise;
- formation of corporate social responsibility;
- joint actions with other market participants to improve energy saving technologies, environmental and social protection.

The organisation of an industrial enterprise, taking into account the outlined directions, will ensure the complexity of the implementation of the economic security system at the enterprise and its high efficiency. In turn, the efficiency of the economic security system of an industrial enterprise will increase its competitiveness on the market.

Conclusions

The study of the principles of economic security of industrial enterprises in competitive conditions made it possible to determine the patterns of application of the system of economic security of industrial enterprises and competitive characteristics of behaviour in the market space. The scientific novelty of this study is to identify the principles of economic security of industrial enterprises in a competitive environment, based on a systematic approach and grouping of requests for economic security of industrial enterprises, formalisation of approaches to substantiate the components of economic security and economic security requirements. Further scientific research requires the search for methodological tools to justify the optimisation of the economic security of industrial enterprises to ensure the stability of operation, protection of economic interests and an increase in competition performance.

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