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Foreword

The high rate of changes which are taking place in the socio-economic, complex sphere result in the occurrence of unprecedented, hardly predictable events and processes, which influence not only the functioning of the economy, but also organizations and people working for them. New times bring new problems, recently aggravated by the SARS-CoV-2 virus epidemic, which cannot be solved without proper research and new knowledge.

In the collection of articles that make up this issue of *The Małopolska School of Economics in Tarnów Research Papers Collection*, being the effect of scientific works conducted within the framework of basic and implementation research, in various academic centres, one can find a lot of cognitively interesting and applicable information. The *Research Papers* are focused on contemporary issues, with particular attention to the problem of product and organizational innovations and changes in the organization's environment.

In particular, the dimensions of diffusion of innovation were presented in relation to the latest payment technologies on the Polish market, start-up as a new organizational form oriented towards innovative solutions in the area of human life quality, innovative processes of shaping the capital structure of Polish enterprises and organizational commitment of employees. An innovative tourist product, i.e. a new tourist route "Lesser Poland Village Fragrant with Herbs" ("Małopolska Wieś Pachnąca Ziołami"), which includes natural values, cultural and gastronomic attractions, is also worth mentioning.

As it can be seen, *The Małopolska School of Economics in Tarnów Research Papers Collection* provide a forum for discussing the evaluation of changes occurring in various organizations and their environment, as well as determining the accuracy of contemporary concepts and the effectiveness of new mechanisms of economics and finance, management instruments, organization of tourism and recreation and determinants of ergonomic work.

In the articles, the Reader will find many original thematic approaches and insights of practical nature. This issue of the journal can be an interesting and useful position both for theoreticians of the mentioned scientific disciplines and for students and practitioners.

On behalf of the authors and myself, I would like to thank all those who have contributed to this work: the editors who took the trouble to give their opinion on the articles submitted to the editorial office, the reviewers for their substantial, important and often detailed comments, as well as the entire editorial team and all collaborators.

Leszek Kozioł
Editor-in-Chief

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The impact of the SARS-CoV-2 virus epidemic on the level of foreign debt of developing countries—mechanisms and concerns. Analysis of the available literature

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Abstract: The SARS-CoV-2 virus outbreak came suddenly, devastating the health systems of other countries regardless of the financial condition of individual countries. And although at the end of 2019 it seemed that it would remain a problem in the Far East, the mechanisms related to globalization and human mobility meant that within a few weeks the strength and capabilities of almost the entire globe were exposed to a huge challenge—similar for every country. All of this took place at a time when analysts boldly predicted another financial crisis—at a time of raging economic processes. These, in turn, are closely related to the necessity to incur foreign debts—especially in the case of developing countries. Therefore, it seems reasonable to analyze the current information in this regard, based on the published data and the position of analysts in this problematic area. At the same time, it will be an introduction to further analyses in-depth with comprehensive data for the coming months.

Keywords: foreign debt, developing countries, SARS-CoV-2 epidemic

1. Introduction

Generating income for the state is a key mechanism to ensure the security of citizens. In this case, we are talking about economic security defined as "a non-inertial system of relative balance of free and regulated commercial activities, with the autonomy of the will of the parties, the need to maintain the existing risk volume by maintaining limited trust in economic and legal relations between the contracting parties, the internal environment and the environment in which a given entity operates" (Raczkowski, 2014, p. 38). The currently observed scale of capital ties at the level of private entrepreneurship, and thus state economies, is closely related to the processes of globalization (in the scope discussed here taking the form of capital migration) in conjunction with the rapidly increasing level of advancement of technology (Bauman, 2000, pp. 56–57). Co-dependency, therefore, in connection

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with the dynamics of the exchange of products and services, is reflected in the flow of capital and technology (Liberska, 2002, p. 18), which directly translates into capital ties between countries, and thus into the structure and level of foreign debt. The current economic crises in comparison with the economic consequences caused by the SARS-CoV-2 virus epidemic now seem to be relatively insignificant—especially since the effects in this area have been predictable so far. But in the face of current events and uncertainties, any good prognosis—including the time when possible repercussions take place—is impossible.

The aim of the article is to analyze selected aspects of foreign debt, taking into account the economic effects of the SARS-CoV-2 virus epidemic on a global scale. The thesis, which the author intends to prove, is focused on the statement that it is necessary to introduce a deeper analysis of the issue of shaping public debt mechanisms in the face of current events related to the SARS-CoV-2 virus epidemic. It seems possible to indicate relations regarding this issue on the basis of data published by certain institutions (historical, current and forecast), but the actual size and structure of foreign debt generated in the analyzed period of the epidemic will be possible in the further time horizon. Therefore, only up-to-date information on foreign debt generated in the last six months by international financial institutions was analyzed.

2. Foreign debt—indicators and purpose of measurement

The level of foreign debt in literature is most often an issue analyzed in relation to developing countries. The primary reason that developing and emerging countries generate external debt is a lack of savings and investment. Countries characterized by an insufficient level of savings with the use of external funds obtained in this way have the opportunity to approach the average (in the region or in the world) level of consumption and economic growth. In addition, low government revenues, low investment levels and unsustainable budget deficits give an additional boost to incurring foreign debt (Gohar, Bhutto and Butt, 2012, p. 4). External debt is therefore a debt to holders of government securities such as Treasury bills and Treasury bonds. Governments borrow by issuing promissory notes, bonds and other securities. Therefore, it can be indicated that the two main reasons for contracting public loans are, first of all, the expected budget revenues lower than the expected expenditure and the repayment of the public debt due. It should be pointed out that external government loans can have both negative and positive effects on economic growth. While in the case of highly developed countries, incurring foreign debt most often (under the so-called normal market conditions) has positive effects, in the case of countries on the way of development it may bring negative results. Countries in the first group are more effective than developing countries in using debt effectively, while coping with the side effects of large indebtedness, which include the crowding out effect, disincentives to investment, market and policy volatility and the outflow of capital from the country resulting from concerns related to currency devaluation. However, incurring external debt may have negative consequences, resulting from ineffective management of the related processes, which are relatively often diagnosed in developing countries. In practice, negative results most often balance all possible benefits of using debt in activities aimed at the assumed goals (Babu et al., 2015, pp. 74–75).

The assessment of the level of debt burden on the economy is made possible by relative indicators describing the debt repayment burden and short-term liquidity (Nakonieczna-Kisiel, 2014, p. 184). The analysis of the literature on the subject leads to the conclusion that two basic indicators for assessing the level of foreign debt relate its value to GDP or (and) exports. External debt as a percentage of gross domestic product (GDP) is the ratio of a country's debt to non-resident creditors to its nominal GDP. External debt in this sense is part of a country's total debt that has been borrowed from foreign lenders, including commercial banks, governments or international financial institutions. External debt comprises the outstanding amount of actual, unconditional liabilities to non-residents by residents of a given country requiring the debtor to repay principal and (or) future interest. The measure of foreign debt to GDP indicates the potential of a given country that could be shifted from production intended for the domestic market to production for export, in the event of problems with debt repayment. Interpretation of this indicator requires taking into account the level of economic development of a given country and other conditions—regarding, for example, the share of debt on market and concessionary conditions, the time structure of the debt, or issues related to the value of the national currency (Głuch and Grotte, 2007, pp. 203–204). The second measure is the ratio showing the relation of total foreign debt to the annual value of exports. Increasing value in the selected period means that the outstanding debt grows faster than the receipts from export (which is the main source of foreign exchange income). The interpretation of this indicator must take into account that the high value may also occur in the case of countries that use external financing of their long-term investments, which, however, does not transfer into problems with the ability to pay off liabilities, if the investments mentioned above are characterized by (and will be characterized in the future) with a high rate of return. Then again, a low or unstable value of the ratio based on the ratio of liabilities to the level of exports may result from high and volatile prices of export goods (Nakonieczna-Kisiel, 2014, p. 184). For the sake of discussion, mention should also be made of the ratio illustrating short-term financial liquidity—the ratio of debt servicing costs to the annual export value. This measure indicates the part of the export revenues necessary to cover the costs of the day-to-day debt service. The larger the proportion, the more the country's ability to finance supply, investment and consumption imports will diminish, which consequently slows down development processes in the economy. A significant shortcoming of this indicator is the noted variability of payments within the scope of debt servicing and export receipts, which makes it unreliable, especially in the case of statements concerning long time horizons. In addition, this ratio does not fully reflect the category of financial liquidity, ignoring the fact of deferring some of the capital installments—this is one of the reasons why the literature suggests using the two previously discussed indicators (Nakonieczna-Kisiel, 2014, p. 184). In the older literature, as often as mentioned above, there is also the liquidity ratio showing the relation of international currency reserves to short-term debt. It illustrates the reserve of foreign exchange reserves that are at the disposal of the monetary authority of the debtor country and the reserve of short-term debt. It can be used in assessing the adequacy of foreign exchange reserves, especially in the case of countries that have incomplete access to international financial markets. In practice, it allows to determine how long the debtor country will be able to pay off its debt

"on its own", even if it is cut off from external financing. A variation of this indicator is the reference to data concerning only government debt (public debt in domestic terms), which, however, is only applicable to countries with an open economy, but with a significant share of the public sector in total foreign debt (Głuch and Grotte, 2007, p. 205).

External public debt can have a non-linear effect on a country's economic growth. In practice, this means that with a low level of indebtedness, an increase in the external public debt to GDP ratio may generate economic growth. However, with a high level of debt, increasing the share of foreign debt may have the opposite effect. As it should be concluded on the basis of the information presented so far, while it is possible to determine the general (indicative) level of the state's foreign debt, the number of variables was included in the analysis of this category of calculations. In practice, the interpretation of the above-mentioned indicators means that it is extremely difficult and requires in-depth analyzes to indicate an unambiguous assessment regarding a specific country. Additionally, it should be mentioned that so far in the theory of economics and international economic relations it has not been possible to establish a single (universal) proposition of an acceptable level of a state's foreign debt. However, there is general agreement in terms of the statement that the amount of liabilities should depend on (Nakonieczna-Kisiel, 2014, p. 183):

- absorption capacity of a given economy, which comes down to the ability to use foreign capital—in this case, the key are the level of development of the country, capital and human resources (capital resources should be large enough for the borrowed funds to be complementary, responsibility for their acquisition and allocation);
- how to use foreign funds (primarily for investment purposes, and not for direct consumption, which may eliminate the possibility of their repayment in the future);
- compliance with the basic rules of indebtedness (the rate of profit on financial investments with foreign loans must be higher than their interest rate, and along with amortization, it should exceed service costs).

The key to adequately securing the level of foreign debt, or rather the possibility of its repayment, is to ensure economic security in the debt country. In this case, economic security should be understood as "relatively balanced, endogenously and exogenously, the state of functioning of the national economy, in which the risk of imbalances is maintained in the designated and acceptable organizational and legal norms as well as the principles of social coexistence" (Raczkowski, 2012, p. 81). This means "the conditions for harmonious development, allowing to build a balanced prosperity of the citizens of the state. […] In macroeconomic terms, security is the stability of employment, a low level of unemployment, predictable prospects for the development of the economy, characterized by financial liquidity. In microeconomic terms, it is the solvency of a household or enterprise. In both cases, it is about the possibility of balancing obligations against the needs in the medium term" (Żurkowska, 2013, p. 32).

Due to the SARS-CoV-2 virus epidemic, it is not only the health systems of individual countries that are facing the huge crisis. The medical crisis directly affects the condition of national economies and—as a result of the aforementioned capital ties—the condition of the economy in a global perspective. By refraining from an in-depth analysis of the SARS-CoV-2 virus epidemic status, a short description of the current state of affairs should be indicated. The

isolation order and the mobility ban affected many sectors of the economy. It is therefore reasonable to conclude that the SARS-CoV-2 virus has wrecked a significant part of the global economy and that the crisis has made itself felt in most sectors.

3. Developing countries during a pandemic in economic terms

Developing countries often get into debt abroad because of low domestic savings. However, this leads to an increase in foreign liabilities, which carries the risk of a debt crisis. Many of the crises that affected these countries were related to the rapidly growing foreign debt, including crisis in Mexico (1994), Russia (1998) and Asian countries (1997–1998). Moreover, the cost of incurring liabilities in the foreign market is often lower than in the domestic market due to differences in interest rates. External financing of public debt also avoids the effect of crowding out limiting domestic investments as a result of absorption of available funds by the public sector (Bilewicz, 2014, pp. 125, 130). The consequence of the aforementioned financial crises that hit the economies of developing countries was the awareness of the dangers of excessive dependence on foreign financing and an attempt to reduce it. This was reflected, inter alia, in changing the strategy of public debt management in some developing countries. It consisted in partial replacement of foreign public debt with debt issued on the domestic market. These strategies are closely related to the efforts of developing countries to strengthen their national financial systems and conduct macroeconomic policies to avoid excessive current account deficits (UNCTAD, 2008, p. 187).

The Covid-19 crisis, which hit developed countries first, spread to developing countries relatively soon. Experts from the United Nations (UN), the United Nations Development Program (UNDP) and the World Health Organization (WHO) have repeatedly emphasized in official documents concern about the long-term impact of the pandemic on these countries. In the case of less affluent countries, the SARS-CoV-2 virus epidemic, which significantly translated into trade relations, shows a special dependence on the possibility of cooperation across national borders. In addition, lower differentiation and specialization of developing countries (compared to the developed economies of North America and Europe) determines the direction of development—most often it is production, supply and tourism. At the same time, these are the industries that suffered the most as a result of the restrictions related to the SARS-CoV-2 virus epidemic. When supply chains were disrupted as a result of domestic restrictions, manufacturing companies in developing countries suffered additional losses. The result is an increased interest in developing countries for support from the International Monetary Fund (IMF). In total, 90 developing countries have so far applied for such aid, and 24 low-income IMF member countries have benefited from debt relief this year (Hawker, 2020). Tackling the effects of the SARS-CoV-2 virus outbreak appears to go beyond the country's ability to pay off its debt or keep the economy going. Healthcare systems in developing countries often lag behind those in developed countries, both in terms of technology and broadly understood capacity. This hindered the initial response to the sudden spike in patient numbers, but also meant that these countries might be less prepared for the next wave of infection. The economic effects are related to the slowdown in the pace of economic development, which affects the possibility of paying off foreign debts. In the coming years,

therefore, analysts forecast problems with debt repayment—with a time horizon of a decade. The reason for such forecasts is valid and fairly simple to diagnose—if developing countries do not generate funding, they cannot meet the conditions of loans from developed countries and banks (such as the US Federal Reserve and the European Central Bank) (Hawker, 2020, online). The poor condition of the economy also means the inability to cover the foreign debt with the debt incurred by its own citizens.

For obvious reasons, the forecasts go far beyond the several-year perspective—the main reason is the depth of the crisis caused by the SARS-CoV-2 virus epidemic. This indicates uncertainty about the level that the economy can reach with full productivity and full employment and labour productivity. Efforts to contain the spread of the SARS-CoV-2 virus outbreak in emerging and developing economies, including low-income economies and limited healthcare capacity, could accelerate deeper and longer recessions, exacerbating a multi-year trend towards slowing potential growth and productivity gains. Many emerging and developing economies experienced weaker growth prior to the ongoing crisis. The additional shock of the current situation makes the challenges faced by these economies even more problematic (World Bank, 2020b).

For developing countries, the global economic crisis brings with it a significant negative external shock. Demand for exports fell sharply, and the forecasted decline in exports in 2020 was supposed to amount to an average of 28% (the differentiation related to the region and the forecast scenario). Commodity prices are plunging to an all-time low with oil and metal prices predicted to fall by 40% and 13%, respectively, in 2020 (World Bank, 2020a). International tourism (measured by tourist arrivals and tourism revenues) will fall by 20–30% this year (UNWTO, 2020). Remittances, an increasingly important source of income in developing countries (predicted), may decline by around 20% in 2020 (World Bank, 2020c). In such an arrangement, external financing inevitably becomes more difficult to obtain, with the largest capital outflow from developing countries to date (over USD 80 billion since the beginning of the crisis) and sovereign spreads increasing by hundreds of basis points (IMF, 2020a). Last but not least, the pandemic carries a large internal shock to developing countries, with direct costs related to disease, healthcare and uncertainty, and indirect costs related to containment and mitigation measures, such as reduction of manpower, productive and productivity. The combined external and internal shocks related to the pandemic will result in an unprecedented systemic contraction in GDP growth in 2020. Across the developing world, there is an estimated decline (relative to pre-pandemic expectations) of around –5% in developing Asia; –8% in developing Europe; –7% in Latin America and the Caribbean; –6% in the Middle East and Central Asia; and –5% in sub-Saharan Africa (Figure 1) (Loayza, 2020).

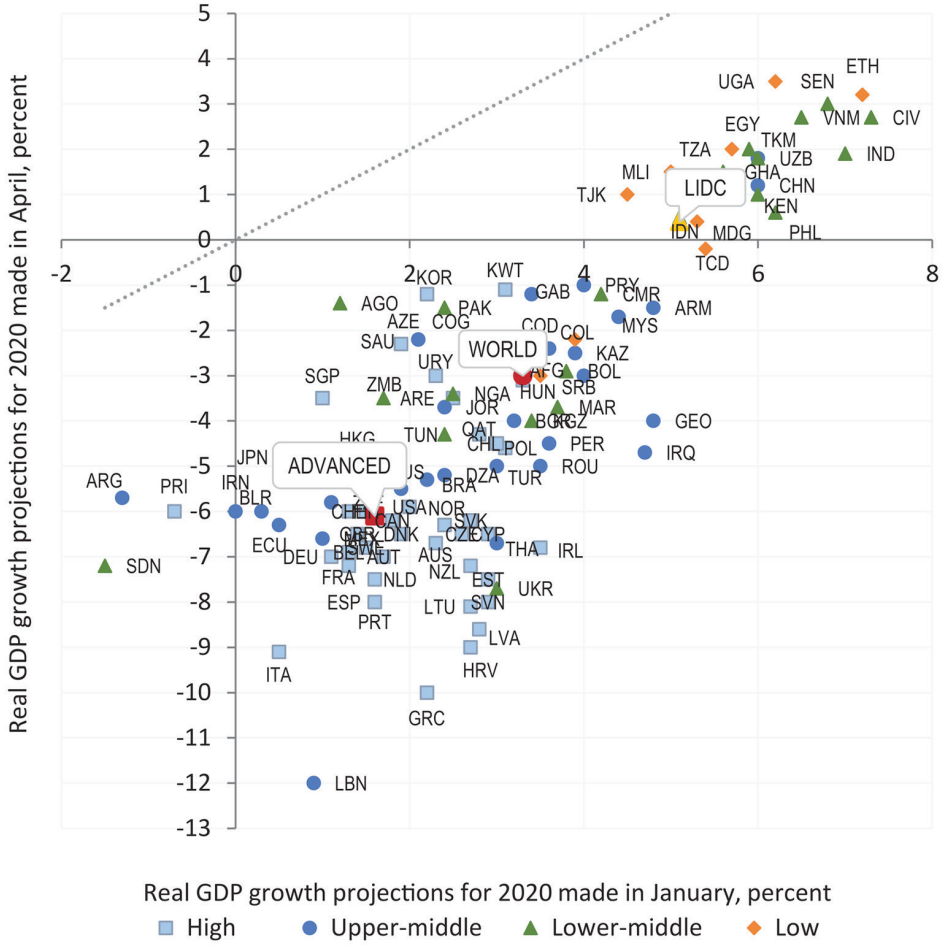

Figure 1. Forecasts and actual levels of GDP by groups of countries

S o u r c e: Loayza, 2020.

The data in the figure compare GDP growth forecasts for 2020. Prepared before and after the outbreak of the pandemic, in January 2020 and April 2020, respectively. "World" means the growth rate of the world economy. "Advanced", "EMDE" and "LIDC" represent, respectively, developed economies, emerging markets and low income developing economies, based on the IMF groups. Countries' income groups follow the World Bank's classification based on annual gross national income (GNI) per capita: Low Income, Less than USD 1,025, Lower Median Income, USD 1,025–3,995, Higher Median Income, USD 3,996–12,375, and High Income: over USD 12,375. The 45-degree line indicates no change in the real GDP growth forecasts for 2020 made in January 2020 and April 2020. Being above (below) the 45-degree line indicates an improvement (deterioration) in real GDP growth forecasts for 2020, in the absence of forecasts in January 2020, the forecasts of October 2019 were used (Loayza, 2020).

4. Pandemic and the level of foreign debt—general view

There is no doubt that the necessity to secure (and heal) citizens and the additional costs associated with it constitute a burden on state budgets—all of them, without exception. Of course, the number of citizens and disease rates are an important factor in this case. Even before the Covid-19 crisis, levels and trends in domestic revenues and external flows to developing economies were considered insufficient to support the Sustainable Development Goals (SDGs). With high levels of public debt and the added pressure of the pandemic on all major sources of development finance, low and middle income countries may find it difficult to finance their public health and social and economic efforts to tackle Covid-19. The observations made since the end of the first quarter of this year indicate that there are significant changes in debt and capital levels, in particular in developing countries, mainly due to a reduction in the number of remittances. The result was a knock-on effect on domestic finances (OECD, 2020).

The SARS-CoV-2 virus outbreak significantly extended the list of developing and emerging market economies affected by the debt problem. For some, the crisis is inevitable. For many others, only extremely low global interest rates can delay payments. Insolvency rates are rising—and so is the need for debt restructuring. However, it should be remembered that the financial crisis affects not only borrowers, but also lenders, which may in practice significantly hinder the effectiveness of the above-mentioned restructuring processes. So far, the pandemic shock has been confined to the poorest countries and has not developed into a full-blown emerging middle income debt crisis. Partly thanks to favourable global liquidity conditions resulting from the massive support of central banks in advanced economies, private capital outflows declined and many middle-income countries were able to continue borrowing in global capital markets. According to the IMF, emerging market governments issued 124 USD billion in hard currency debt in the first six months of 2020, with two-thirds of the lending activity falling in the second quarter. The so-called waves of infections—it is therefore impossible to clearly define accurately and generally overlapping lending activities. However, analysts emphasize—which should be agreed—that the most risky period will fall in the spring and summer months of 2021, i.e. the period in which, according to plans, in other developed countries, health care systems will be able to carry out large-scale vaccination plans. They assume, of course, that the epidemic will not change for worse. Even in the best-case scenario, international travel will face roadblocks and uncertainty among consumers and businesses is likely to remain high. At the same time, the level of poverty has increased due to negative changes in the level of employment, which will probably be a permanent element of the economic and social landscape for a long time. While many emerging market governments managed to borrow more in local currencies, businesses continued to accumulate foreign currency debt. Accordingly, it is likely that emerging market governments will succumb to pressure to buy out their corporate national leaders, as did the United States and European countries—especially the EU. In addition to the dramatic decline in private funding, remittances from emerging market citizens working elsewhere fell by more than 20% in 2020. At the same time, borrowing needs have risen sharply as emerging and developing economies face the same budgetary pressures as developed economies. In addition, borrowing needs will grow as the economic damage caused by the epidemic grows

(diagnosed). Increasing fiscal pressure is accompanied by a new wave of sovereign debt downgrades, exceeding the peak levels in previous crises. They persisted even after credit conditions were eased by major central banks in developed countries. Central banks' purchases of corporate bonds to support local firms in emerging markets and emerging economies also worsened their debt ratings (IMF, 2020b).

The above-mentioned concerns are justified by the fact that the period of the SARS-CoV-2 virus epidemic coincided with a period in which the foreign indebtedness of developing countries gradually progressed—the literature mentions a period lasting from 2010. Therefore, in order to have a fuller insight into the current situation it should be signaled what happened in the scope discussed here on the time horizon (Figure 2).

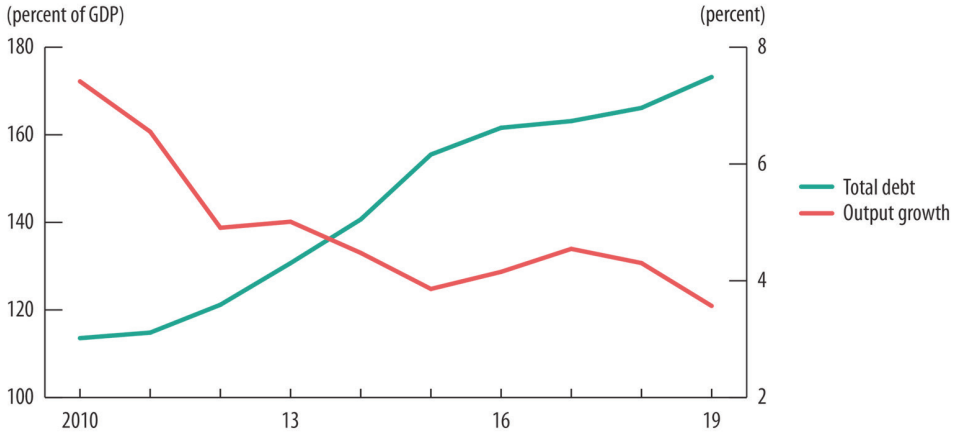

Figure 2. Growth and debt (2010–2019)

S o u r c e: Kose et al., 2020, p. 42.

Combined with the higher level of indebtedness in emerging and developing economies, output growth tended to decline overall between 2010 and 2019. Successive waves show some interesting similarities as well as differences. According to some historical cases, global interest rates have been very low since the global financial crisis and—until the outbreak of the pandemic—the ensuing profit-seeking by investors contributed to narrowing spreads for emerging economies. Until recently, major changes in financial markets have stimulated debt levels again, including through an increase in the number of regional banks, an increase in appetite for local currency bonds, and an increased demand for debt in emerging markets and emerging economies from the economic expansion of the non-banking financial sector. As economic growth slows down in these economies, their weaknesses have increased. Emerging and developing economies have survived periods of volatility during the current wave of debt accumulation, but widespread and severe financial stress only emerged after the Covid-19 pandemic hit. The ability of these economies to withstand financial stress is further complicated by other weaknesses, such as rising budget and current account deficits and the

shift towards riskier debt. Among low-income countries, more than half of the public debt is granted on an unconventional basis (Kose et al., 2020, p. 42).

The SARS-CoV-2 virus outbreak has brought an abrupt end to the calm in financial markets and is no doubt a test of the resilience of developing countries' economies, institutions and policies. They face a developing global recession in a much more vulnerable situation than when the 2009 crisis hit (which was expected both in terms of possible timing and nature). Finally, it is worth quoting a few remarks that organize the information presented above. It seems that the discussion in recent literature rightly focuses on foreign debt. However, external debt accounts for only a third of total public debt in emerging economies—the remainder owed to domestic investors. Domestic and foreign debts are not similar to each other. External debt is the shifting of resources into and out of the economy, which can help balance consumption over the business cycle. However, domestic debt cannot be used for this purpose, because its issuance and repayment takes place within the framework of the state economy—a domestic loan therefore does not bring additional resources. Foreign insolvency is more likely after a negative productivity shock (which is why this ratio was discussed in this review) and is almost independent of the level of public spending, while domestic default is more likely after a large public spending shock, but is almost independent of the level of public spending performance (Paczos, Shakhnov, 2020). The "Covid shock", which limits production and increases government spending, is bringing economies (not only in developing countries) to total insolvency. Even in the case of well-designed foreign debt restructuring and standstill programmes, it seems that a wave of domestic insolvencies can be expected in the coming years (as the authors mentioned above assume—not the only ones). However, due to the topicality of the issues and not fully known global fate, the information presented here should be considered as an introduction to the ex post analysis—it would be appropriate to wish for such an analysis to be possible as soon as possible.

5. Summary

The diagnosis of the crisis caused by the SARS-CoV-2 virus epidemic is aptly summarized in the form of the slogan "shock of the century". It affects beyond the health and social spheres, it has also touched the economic sphere in a special way. In addition, from the very beginning, every shock is accompanied by uncertainty, which began to be timidly eliminated only by the recent information about the availability of vaccines by other drug manufacturers. Certainly—as demonstrated by the analysis presented in the presented text—some relations between the presented historical, current and forecast data can be identified today. However, only the next months (or most likely years) will reveal all dependencies related to foreign debt in full. This is an introduction to a deeper analysis based on more complete quantitative and qualitative data than today. Foreign debt currently generates several dangers related to future insolvencies of state economies. The first is the condition of individual economies from the point of view of the global market (mutual trust of lenders and borrowers). The second is the rather negligible margin of foreign debt restructuring in practice, which will be due to the fact that most countries (especially developing countries) will find themselves in a similar debt situation after the pandemic. The third (most noticeable for citizens of indi-

vidual countries) will be the fact that the already launched aid programmes—including those proposed by international economic institutions—are aimed at helping them, with particular emphasis on their economic activity, which directly translates into the possibility of generating GDP. The final danger is that developing countries' foreign debt defaults over the past decade will occur in an avalanche and the former will entail further ones, increasingly polarizing developed countries and those that have just entered their path of development.

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Wpływ epidemii wirusa SARS-CoV-2 na poziom zadłużenia zagranicznego państw rozwijających się. Analiza dostępnej literatury

Abstrakt: Epidemia wirusa SARS-CoV-2 przyszła nagle, druzgocąc systemy zdrowotne kolejnych państw bez względu na ich kondycję finansową. I choć jeszcze pod koniec 2019 roku wydawało się, że pozostanie ona problemem Dalekiego Wschodu, mechanizmy związane z globalizacją i z ludzką mobilnością sprawiły, że w ciągu kilku tygodni siły i możliwości całego niemal globu zostały wystawione na potężną próbę – podobną dla każdego kraju. Wszystko to miało miejsce w momencie, kiedy coraz śmielej analitycy przepowiadali kolejny kryzys finansowy – czyli w momencie rozszalałych procesów gospodarczych. Te z kolei ściśle wiążą się z koniecznością zaciągania długów zagranicznych – zwłaszcza w przypadku krajów rozwijających się. Zasadne wydaje się więc dokonanie analizy aktualnych informacji w tym zakresie na podstawie publikowanych danych i stanowiska analityków tego obszaru problematycznego. Będzie to jednocześnie wstęp do dalszych analiz, pogłębionych o całościowe dane z kolejnych miesięcy.

Słowa kluczowe: dług zagraniczny, kraje rozwijające się, epidemia SARS-CoV-2

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Determinants of the capital structure of Polish industrial enterprises

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Abstract: The subject of the article covers the determinants of the capital structure. The aim of this study is to examine the relationship between the capital structure and the liquidity, profitability, age and size of Polish industrial companies. The literature review allowed for the formulation of hypotheses that Polish enterprises shape the capital structure in accordance with the theory of the hierarchy of financing sources. According to this hypothesis, five detailed hypotheses were selected. In order to verify the hypotheses, statistical methods such as basic descriptive statistics and the Pearson correlation coefficient were used. The sample consists of 100 companies listed on the Warsaw Stock Exchange. The study covers the years 2010–2019. The research results confirm the negative relationship between liquidity and debt. Companies that have difficulties with meeting their current liabilities to a greater extent use borrowed capital financing. There is also a negative correlation between profitability and debt. This means that enterprises that use foreign capital to a greater extent are less profitable. The hypothesis that larger companies have higher levels of debt is also confirmed. In addition, it has been noted that older companies are more likely to use long-term debt. On the basis of the obtained results, it can be concluded that the capital structure of Polish industrial enterprises is consistent with the theory of the hierarchy of financing sources. The research complements the existing research on the issues of shaping the capital structure. It provides results based on current data, which makes it possible to use them in practice. The obtained results may facilitate the decision-making process in the scope of capital structure for enterprises.

Keywords: capital structure, capital structure theories, liquidity, profitability, industrial companies

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1. Introduction

Issues related to shaping the capital structure of enterprises have been the subject of both theoretical and empirical research for many years. The authors made attempts to determine the determinants of the capital structure. As a result of the research, many theories of capital structure emerged. One

of them is the theory of Miller and Modigliani, also known as the theory of the irrelevance of the capital structure (Modigliani and Miller, 1958). The authors concluded that in the conditions of a perfectly competitive capital market, the capital structure does not affect the goodwill. Then, in 1977, Miller confirmed the theory of the irrelevance of the capital structure. The creator proved that the introduction of personal income tax and legal persons means that debt financing does not affect the value of the enterprises (Miller, 1977). This theory was constantly developed as a result of which new theories emerged, including the signalling theory and the theory of the hierarchy of funding sources. These concepts emphasize various factors determining the company's capital structure. Numerous studies show that profitability and liquidity have a significant impact on the capital structure. According to the theory of the hierarchy of financing sources, enterprises prefer to finance their activities with equity. Thus, companies with higher profitability use less foreign capital to a lesser extent (Pinegar and Wilbricht, 1989). A different concept is illustrated by the signalling theory, according to which profitable companies are characterized by a high share of debt in the capital structure (Connelly et al., 2011).

The subject of shaping the capital structure is very complex. This is confirmed by numerous empirical studies, on the basis of which it is not possible to draw unequivocal conclusions. When analyzing the same factors, the authors often obtained different results depending on the selection of the sample (including the specificity of the industry, the period of research, the size of the sample).

The purpose of this study is to investigate the relationship between company liquidity, profitability, size, age and corporate debt. Based on the literature review, it is assumed that Polish enterprises shape the capital structure in accordance with the theory of the hierarchy of financing sources. In line with this assumption, five hypotheses were selected. It is assumed that both age, financial liquidity and profitability are negatively correlated with the company's debt, while the size of the enterprise shows a positive relationship with the capital structure. However, no current empirical studies confirming the hypotheses for Polish industrial companies have been found. Thus, in order to fill the research gap, the study covered a hundred industrial companies listed on the Warsaw Stock Exchange. In order to verify the hypotheses, statistical methods such as basic descriptive statistics and the Pearson correlation coefficient were used.

2. Literature review

The literature on the subject presents various approaches to the concept of capital structure. However, in the most general terms, the capital structure is determined by the proportions of the share of equity and foreign capital in the financing of the enterprise. Sometimes the capital structure is understood as the ratio of long-term debt to equity. Then again, the task of the capital structure theory is to define the method of making decisions within the financing of the company (Bętkowska, 2016).

The literature also discusses various classifications of factors influencing the capital structure. The most important determinants of the capital structure, the authors mention, among others, liquidity, profitability, size and age of the enterprise (Mądra-Sawicka and Kalisia,

2017). Financial liquidity is understood as the company's ability to pay its short-term liabilities on time (Kuciński, 2021). Profitability, alternatively, is defined as the financial condition of an enterprise expressed in terms of the financial result from economic activity. The profit level does not objectively reflect the company's profitability, so it is defined as the ratio of profit to the financial statement items such as sales revenues, equity, assets (Gawryś and Trippner, 2017).

Duliniec conducted a study on the basic determinants of capital structure. Based on the current state of research in the field of financing structure, the author concludes that when choosing sources of financing, enterprises are mainly guided by the current situation of the company and the conditions on the financial market. It also claims that the company's capital structure is the cumulative result of decisions made in the selection of financing sources. The main factors influencing these decisions include: company size, profitability, growth potential, materiality of assets, the average level of the leverage ratio for the industry and expected inflation (Duliniec, 2015).

Jerzemowska and Hajduk studied the relationship between the capital structure of companies and profitability. The authors cite the existing theories of capital structure, which, however, do not clearly define the direction of the impact of this relationship. The research sample included 196 companies listed on the Warsaw Stock Exchange in 2005–2010. The study proves a positive relationship between profitability and the capital structure of enterprises from the trade and services sector (Jerzemowska and Hajduk, 2015).

Hamrol and Sieczko took up the subject of the capital structure of enterprises and the factors shaping it. The research covered companies listed on the Warsaw Stock Exchange. The hypothesis about the possibility of identifying factors influencing the structure of Polish enterprises was confirmed (Hamrol and Sieczko, 2006).

The analysis of the capital structure on the Polish market was also carried out by Hajduk. The author, based on the review of empirical research and the results of own research, presents the classification of the most important determinants of the capital structure and discusses the methods of analyzing capital structure factors (Hajduk, 2018).

Sorana Vătavu explored the relationship between capital structure and financial performance. The sample included 196 Romanian companies from the manufacturing sector. The study covered the years 2003–2010. To analyze the capital structure, the ratios of long-term debt, short-term debt, total debt and total equity were used. Then again, the determinants of the results were return on assets and return on equity. Research shows that Romanian companies that finance their operations with equity and avoid debt achieve better financial results. Firms facing financial difficulties prefer more indebtedness (Vătavu, 2015).

Anila Çekrezi also conducted a study of the relationship between the structure of capital and the liquidity and profitability of companies. 65 unlisted Albanian companies in 2008–2011 were surveyed. Research results confirm the impact of liquidity, profitability and company size on financial leverage. The author also proves a significant positive relationship between size and financial leverage and a significant negative relationship between the profitability of total assets and financial leverage. The results show that the capital structure of enterprises varies depending on the industry (Çekrezi, 2013).

Kinga Mazur investigated the relationship of the capital structure with variables such as: asset structure, liquidity, company size, dividend policy, product uniqueness, development opportunities, profit volatility, effective tax rate. The aim of the article was to define the dominant theory of capital structure used by the studied companies. The sample covers Polish companies listed on the Warsaw Stock Exchange in 2000–2004. The research results show the dominant importance of the pecking hypothesis in the financing of Polish companies (Mazur, 2007).

Alipour, Mohammadi and Derakhshan also examined the factors influencing the capital structure. They surveyed production companies listed on the Iranian stock exchange in 2003–2007. The survey results show the relationship between profitability, liquidity, company size, financial flexibility, and asset structure with the capital structure of Iranian companies. Moreover, it was found that short-term debt plays an important role in the financing of the surveyed companies. The authors confirm the compliance of the research results with some theories of capital structure (Alipour, Mohammadi and Derakhshan, 2015).

Uremadu and Efobi emphasize the importance of the capital structure for the financial stability, profitability and liquidity of companies, especially in times of global financial crises. The sample includes data from 10 Nigerian companies for the period 2002–2006. The research results show the negative impact of long-term debt, the ratio of long-term debt to total liabilities and short-term debt to total liabilities on returns. The authors recommend Nigerian companies to maintain a balanced share of long-term debt in the capital structure (Uremadu and Efobi, 2012).

Sheikh and Wang studied the determinants of the capital structure of 160 production companies listed on the Karachi Stock Exchange in 2003–2007. The results show a negative relationship between the debt ratio and liquidity, profitability, asset structure and profit volatility, and a positive relationship with company size. The authors of the article confirm compliance with the compromise theory, pecking order theory and agency theory (Sheikh and Wang, 2011).

Najeb Masoud also researched the factors influencing the capital structure of companies. The study was conducted on a sample of Libyan listed companies and covered the years 2008–2013. The research results show that both the pecking order theory and the trade-off theory can explain the financial decisions of the surveyed companies. Researchers conclude that high rates of return and high price-earnings ratios contribute to the dominance of equity in the financing structure, as both factors reduce the cost of equity financing (Masoud, 2014).

3. Sample

This study covers companies listed on the Warsaw Stock Exchange. The data comes from the Notoria database containing financial statements of enterprises. The examined factors are characterized by different specifics depending on the industry, therefore they have an impact on decisions regarding the capital structure. In order to avoid erroneous results, only companies operating in industry were separated from all enterprises included in the database. Companies with missing data were excluded to minimize the error rate in the results obtained. After the selection, a sample of 100 companies remained. The data covers the period of 10 years (2010–2019). Thus, the database contains annual panel data of 100 Polish industrial companies, which gives 1000 annual observations.

4. Methodology

Statistical calculations used in the conducted research were performed with the SPSS software. The variables have been divided into two groups: dependent and independent. The dependent variables included financial liquidity, profitability, age and company size. Then again, debt ratios are independent variables.

Financial liquidity was measured using three ratios: the current, quick and increased liquidity ratio. Profitability was expressed using the return on assets (ROA) and return on equity (ROE) ratios. At the same time, the size of the company as the natural logarithm of total assets. The method of calculating individual indices concerning dependent variables is presented in Table 1.

Table 1. Dependent variables—the method of calculating

Dependent variable name	Formula
Current liquidity ratio	$\frac{current\ assets}{short\text{-}term\ liabilities}$
Quick liquidity ratio	$\frac{current\ assets - inventories - short - term\ prepayments}{short - term\ liabilities}$
Cash liquidity ratio	$\frac{cash}{short\text{-}term\ liabilities}$
Return on total assets (ROA)	$\frac{net\ profit}{total\ assets}$
Return on equity (ROE)	$\frac{net\ profit}{equity\ capital}$
The size of the company	$ln\ (total\ assets)$

S o u r c e: Sierpińska and Jachna, 2009.

The second group of analyzed variables were independent variables measured with the debt ratios: capital structure ratio, total debt ratio, long-term debt and short-term debt. The method of calculating individual indices for independent variables is presented in Table 2.

Table 2. Independent variables—the method of calculating

Independent variable name	Formula
Capital structure ratio	$\frac{equity\ capital}{total\ liabilities}$
Total debt ratio	$\frac{total\ liabilities}{total\ assets}$
Long-term debt ratio	$\frac{long\text{-}term\ liabilities}{equity\ capital}$
Short-term debt ratio	$\frac{short\text{-}term\ liabilities}{equity\ capital}$

S o u r c e: Sierpińska and Jachna, 2009.

The most frequently studied factors influencing the capital structure are: age, size of the company, industry, profitability and liquidity. The research conducted so far does not clearly reflect in what direction and with what force individual determinants of the capital structure affect. However, as there is sufficient evidence that the industry in which the company operates has a significant impact on its capital structure, only industrial companies were examined (Çekrezi, 2013). Taking into account the above literature review, four research hypotheses were formulated.

Hypothesis 1: The size of the enterprise is positively correlated with debt. Thus, the larger the company, the higher the debt level. This assumption results mainly from the asymmetry of information in smaller companies, as well as with difficult access to foreign capital.

Hypothesis 2: The age of the enterprise is negatively correlated with debt. Thus, the older the enterprise, the lower the debt level. This hypothesis is based on the theory of the hierarchy of funding sources. Older enterprises accumulate equity capital by resigning from external sources of financing.

Hypothesis 3: The age of the enterprise is positively correlated with long-term debt. Older enterprises are more likely to use long-term sources of financing.

Hypothesis 4: Liquidity is negatively correlated with debt. Thus, the greater the liquidity, the lower the debt level. Companies that have difficulties in paying their current liabilities prefer greater debt.

Hypothesis 5: Profitability is negatively correlated with debt. Enterprises financing their operations with equity and avoiding debt achieve better financial results.

Statistical methods such as basic descriptive statistics in the form of mean, median, minimum, maximum value and standard deviation were used to describe the research sample. However, in order to verify the hypotheses, the Pearson correlation coefficient was used due to the quantitative nature of all variables.

5. Results and their analysis

In order to pre-analyze the research sample, descriptive statistics (mean, median, minimum, maximum value, standard deviation) were calculated.

Table 3. Basic descriptive statistics

Variable	Mean	Median	Minimum	Maximum	Standard deviation
Current liquidity ratio	1.70	1.53	0.66	7.57	0.91
Quick liquidity ratio	1.09	1.06	0.34	3.24	0.47
Cash liquidity ratio	0.33	0.23	0.02	2.16	0.36
Return on total assets (ROA)	0.04	0.04	–0.24	0.17	0.06
Return on equity (ROE)	0.07	0.08	–0.53	0.69	0.14
The size of the company	13.24	13.12	10.01	2.10	1.75

Company age	44.80	24.00	8.00	246.00	43.36
Capital structure ratio	1.30	1.25	0.12	3.83	0.75
Total debt ratio	0.48	0.46	0.09	0.92	0.15
Long-term debt ratio	0.49	0.28	0.01	7.06	0.86
Short-term debt ratio	0.99	0.66	0.09	4.85	0.95

S o u r c e: Author's own elaboration.

The data collected in Table 3 show the descriptive statistics of the studied variables. When analyzing the three financial liquidity ratios, significant differentiation can be noticed. The average value of the current liquidity ratio is 1.70, the quick ratio is 1.09, and the cash ratio is 0.33. The lowest value of the cash liquidity ratio is at the level of 0.02. The average value of the return on total assets is 0.04 (standard deviation 0.06), the minimum value is –0.24, and the maximum value is 0.17. Then again, the average return on equity of the analyzed companies is 0.07, the minimum value –0.53, and the maximum value 0.69. The median size of the company was 13.12. The greatest differentiation of the studied sample occurs within the age of companies. The oldest company has been operating on the market for 246 years, and the youngest—only 8 years. The median for age is 24.00 years (standard deviation 43.36).

In the case of the capital structure ratio, there are slight discrepancies between the mean (1.30) and the median (1.25) with a standard deviation of 0.75. The total debt ratio ranges from 0.09 to 0.92. The smallest value of the short-term debt ratio is also 0.09, and the highest is 4.85. The median of the long-term debt ratio is 0.28.

Summarizing the above statistics, it can be stated that the sample is diverse in terms of the variables studied.

The next stage of the analysis is the verification of hypotheses. In order to verify the hypotheses, Pearson's correlation coefficient was calculated.

5.1. Verification of Hypothesis 1

First, the validity of Hypothesis 1 was examined. Thus, the relationship between the size of firms and individual debt ratios was checked. The hypothesis is that the size of the company is positively correlated with debt.

Table 4. Correlation between company size and debt ratios

	Pearson's r correlation coefficient	Significance (p)
	Size	
Capital structure ratio	–0.172	0.087
Total debt ratio	0.198*	0.024
Long-term debt ratio	0.052	0.305
Short-term debt ratio	0.034	0.368

* Correlation coefficients are significant with $p < 0.05$

S o u r c e: Author's own elaboration.

The results of the correlation of the size of companies with individual indebtedness ratios of enterprises are presented in Table 4. When analyzing the collected data, it can be observed that a statistically significant correlation between the size of a company and its debt occurs only in the case of the total debt ratio. The value of Pearson's r correlation coefficient is, in this case, 0.198 with a significance level of 0.024. Thus, on this basis, we can confirm the validity of Hypothesis 1. A positive correlation indicates that the larger the size of the company, the greater the total debt ratio.

5.2. Verification of Hypotheses 2 and 3

In this part of the study, we examine the relationship between the company's age and individual debt measures. Hypothesis 2 assumes that there is a negative correlation between the company's age and its debt. At the same time, Hypothesis 3 provides that the older the enterprises, the higher the long-term debt ratio.

Table 5. Correlation between company age and debt ratios

	Pearson's r correlation coefficient	Significance (p)
Age		
Capital structure ratio	–0.049	0.626
Total debt ratio	0.180	0.073
Long-term debt ratio	0.440*	0.001
Short-term debt ratio	0.125	0.215

* Correlation coefficients are significant with $p < 0.05$

S o u r c e: Author's own elaboration.

By analyzing the data collected in Table 5, we can conclude that the company's age is positively correlated with long-term debt. The value of Pearson's r correlation coefficient is 0.440 with a significance level of 0.001. However, in the case of the remaining indicators, there is a correlation at a significance level greater than 0.05. On this basis, the Hypothesis 2 cannot be confirmed, but the Hypothesis 3 turns out to be justified. It turns out that older enterprises make greater use of long-term external sources of financing.

5.3. Verification of Hypothesis 4

Then, the relationship between financial liquidity and debt was examined. Hypothesis 4 was verified, assuming that the higher the level of liquidity, the smaller the debt.

Table 6. Correlation between liquidity and debt ratios

	Pearson's r correlation coefficient	Significance (p)
Current liquidity ratio		
Capital structure ratio	0.429*	0.001
Total debt ratio	–0.600*	0.001
Long-term debt ratio	–0.199*	0.023
Short-term debt ratio	–0.304*	0.001

Quick liquidity ratio		
Capital structure ratio	0.495*	0.001
Total debt ratio	–0.484*	0.001
Long-term debt ratio	–0.165	0.051
Short-term debt ratio	–0.272*	0.003
Cash liquidity ratio		
Capital structure ratio	0.318*	0.001
Total debt ratio	–0.492*	0.001
Long-term debt ratio	–0,002	0.491
Short-term debt ratio	–0.172*	0.044

* Correlation coefficients are significant with $p < 0.05$

S o u r c e: Author's own elaboration.

Analyzing the data in Table 6, we can see that all liquidity ratios have a negative correlation with the total debt, long-term debt and short-term debt ratios. Only in two cases the significance level is higher than 0.05, i.e. the correlation of the long-term debt ratio with the quick liquidity ratio and the cash liquidity ratio. The highest level of impact occurs in the case of the correlation of current liquidity with total debt, as the Pearson correlation coefficient r is –0.6 with a significance level of 0.001.

On this basis, we can confirm Hypothesis 4, because the higher the level of financial liquidity, the lower the debt. When analyzing the data, a significant relationship between the capital structure ratio and financial liquidity can be observed. The Pearson r coefficient in the case of the relationship between quick liquidity and the capital structure is 0.495 (significance level 0.001). Thus, Hypothesis 4 should be extended to include the analysis of the relationship between the capital structure and financial liquidity. It can be concluded that companies with a higher ratio of total liabilities coverage with equity maintain a higher level of financial liquidity.

5.4. Verification of Hypothesis 5

In this part of the study, the relationship between the return on total assets, return on equity and individual debt ratios was analyzed. Hypothesis 5 assumes that greater profitability is associated with less debt.

Table 7. Correlation between profitability and debt ratios

	Pearson's r correlation coefficient	Significance (p)
Return on total assets (ROA)		
Capital structure ratio	0.109	0.282
Total debt ratio	–0.210*	0.018
Long-term debt ratio	–0.318*	0.001
Short-term debt ratio	–0.125	0.107
Return on equity (ROE)		
Capital structure ratio	–0.075	0.460
Total debt ratio	0.052	0.304
Long-term debt ratio	–0.341*	0.001
Short-term debt ratio	0.093	0.178

* Correlation coefficients are significant with $p < 0.05$

Source: Author's own elaboration.

In order to verify Hypothesis 5, the correlation coefficients r Pearson ROA and ROE with individual debt ratios were calculated. The data are presented in Table 7. Significance at the assumed level lower than 0.05 occurs only in three cases. All statistically significant relationships are negative ($p < 0.05$). The ROA correlation coefficient with total debt is –0.210, the ROA correlation coefficient with long-term debt is –0.318, and the ROE correlation coefficient with long-term debt is –0.341. Thus, Hypothesis 5 about the negative correlation of profitability with debt is confirmed.

6. Conclusions

It was expected that the larger the size of the company, it is associated with the greater debt. It can be concluded that the assumptions made are correct. Moreover, it is noted that they are in line with the funding source hierarchy theory. Among other things, it assumes that larger companies have better access to information, as well as a lower risk of liquidity loss, which allows for higher levels of debt (Gajdka, 2002).

It was assumed that the older companies have lower debt levels. The results of the study do not support this hypothesis. However, it is noted that the company's age is positively correlated with long-term debt. This means that older companies are more likely to use long-term debt.

It was presumed that more liquidity is associated with less debt. The study confirms the assumptions. This means that enterprises that have difficulties in paying their current liabilities have greater debt. Moreover, it is noted that companies achieving a higher ratio of total liabilities coverage with equity maintain higher liquidity.

It was also expected that the increase in profitability was associated with lower debt. The research results support the hypothesis. Thus, companies that finance their activities with greater equity capital are more profitable. Jaworski and Czerwonka obtained consistent results, concluding that increasing profitability should increase the share of equity in the capital structure (Jaworski and Czerwonka, 2018). At the same time, different research results were presented by Jerzemowska and Hajduk, pointing to a positive relationship between profitability and the capital structure of the trade and services sector, thus confirming the signalling theory. However, they emphasize that in the research conducted so far on the Polish market, there has always been a negative relationship in line with the theory of the hierarchy of financing sources (Jerzemowska and Hajduk, 2015).

On the basis of the obtained results, it can be concluded that the capital structure of Polish industrial enterprises is consistent with the theory of the hierarchy of financing sources. The research confirms and updates the previously conducted research. It should be noted the previously mentioned research by Jaworski and Czerwonka on the negative relationship between profitability and capital structure (Jaworski and Czerwonka, 2018). The results of the study also confirm Mazur's conclusions that the theory of the hierarchy of financing sources best describes the financial decisions of Polish companies (Mazur, 2007).

The added value is the selection of the sector of industrial companies that play a very important role in the Polish economy. It is also important that the study covers up to 10 years (2010–2019). Thus, the research is up-to-date and can be used in the practice of operating companies. It should be noted that the structure of capital is also influenced by other factors identified by other authors, which makes it possible to extend the research carried out in the future.

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Determinanty struktury kapitału polskich przedsiębiorstw przemysłowych

Abstrakt: Tematyka artykułu obejmuje determinanty struktury kapitału. Celem niniejszego opracowania jest zbadanie zależności pomiędzy strukturą kapitału a płynnością, rentownością, wiekiem oraz rozmiarem polskich firm przemysłowych. Dokonany przegląd literatury pozwolił na postawienie hipotez wskazujących, że polskie przedsiębiorstwa kształtują strukturę kapitału zgodnie z teorią hierarchii źródeł finansowania. Zgodnie z tą hipotezą wyłoniono pięć hipotez szczegółowych. W celu ich weryfikacji zastosowano metody statystyczne takie jak podstawowe statystyki opisowe oraz współczynnik korelacji r Pearsona. Próbę stanowi 100 spółek notowanych na Giełdzie Papierów Wartościowych w Warszawie. Badania obejmują lata 2010–2019. Wyniki badań potwierdzają ujemny związek płynności z zadłużeniem. Firmy mające trudności z regulowaniem zobowiązań bieżących w większej mierze korzystają z finansowania kapitałem obcym. Zauważa się również ujemną korelację pomiędzy rentownością a zadłużeniem. Oznacza to, że przedsiębiorstwa korzystające w większym stopniu z kapitałów obcych są mniej zyskowne. Potwierdza się także hipoteza, że większe spółki mają większy poziom zadłużenia. Ponadto zauważa się, że starsze firmy chętniej korzystają z zadłużenia długoterminowego. Na podstawie uzyskanych wyników można wnioskować, że struktura kapitału polskich przedsiębiorstw przemysłowych jest zgodna z teorią hierarchii źródeł finansowania. Badanie stanowi uzupełnienie istniejących badań o problematyce kształtowania struktury kapitału. Dostarcza wyników na podstawie bieżących danych, przez co umożliwia ich wykorzystanie w praktyce. Otrzymane wyniki mogą ułatwić przedsiębiorstwom proces podejmowania decyzji w zakresie struktury kapitału.

Słowa kluczowe: struktura kapitału, teorie struktury kapitału, płynność, rentowność, firmy przemysłowe

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Dependencies between financial ratios among companies listed on the Warsaw Stock Exchange

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Abstract: The dependencies between liquidity, profitability and indebtedness ratios are usually quite unclear. Many empirical studies provide insight into this issue. However, research results are varied and often inconsistent. Hence, it was decided to verify the relationships between the title groups of indicators, taking into account the Polish capital market. The research methodology included mainly the literature review and data analysis (using descriptive statistics and correlation). The research sample consisted of the majority of companies listed on the Warsaw Stock Exchange and covered the period 2015–2019. Based on this analysis, the following conclusions were drawn. Regarding liquidity ratios, it is worth pointing out that their values are strongly differentiated. On average, it seems that analyzed entities were characterized by quite a safe level of liquidity. Most of the companies were also generating income (in more than 60% of cases). The level of their indebtedness was medium, but coverage ratios were at a fully satisfactory level on average. The relationships between liquidity and profitability indicators were varied, there was no significant correlation between them. An increase in profitability/ liquidity on average led to slightly negative or no relevant changes in liquidity/ profitability. For the dependence between profitability and indebtedness, it was rather a negative one. Similarly, a negative correlation was observed in the case of the liquidity and the level of indebtedness.

Keywords: financial ratios, liquidity, profitability, indebtedness

1. Introduction

Financial analysis is one of the most common and important issues that concern enterprises. The analysis of assets, liabilities, revenues and costs is often a source of valuable information to managers, allowing them to make more accurate management decisions. As parts of financial analysis, there are usually extracted preliminary analyses (for instance of balance sheet or income statement) and ratio analysis. The second of these is often focused on measuring liquidity, profitability and indebtedness. In the literature of the subject, there are different opinions concerning the relationship between these groups

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of indicators. For example, an increase in indebtedness may result in the necessity of paying higher interests and thus lower profitability. Then again, more liabilities might allow financing new investments resulting in an increase in profitability. Therefore, the dependencies between a mentioned group of indicators are quite unclear. Hence, it was decided to check how these relationships are shaped on the Polish capital market.

The aim of this paper is to verify if there are any (positive or negative) significant relationships between liquidity, profitability and indebtedness ratios on the example of Polish listed companies. The study was based on the data from the Warsaw Stock Exchange (WSE) for the period 2015–2019. Applied research methods consist of literature review, empirical data analysis, induction and deduction methods.

2. Liquidity, profitability, indebtedness and ratio analysis

Liquidity is understood as the ability to pay current obligations, so it refers to short-term requirements. Liquidity risk is strongly linked to the timing of cash inflows and outflows (Subramanyam, 2014). The most frequently used measures in the context of liquidity are internal indicators, as current ratio and quick ratio (Arnold, 2005).

Profitability is defined as "reflection, in the most synthetic form, of efficiency of business management" (Sierpińska and Jachna, 2004). It refers to involved capital or funds expenditures. It can be stated that when the company is generating income, its profitability is positive. However, it is essential to measure profitability ratios' changes by years. The most popular indicators are: return on assets, return on equity and return on sales, that express the ratio of net income to assets, equity and sales revenues, respectively.

Debt is a part of sources of funding that is obtained from external origins. It might affect the company's performance in different ways, including debt service cost and, then again, greater development opportunities. Some insight into the impact of debt on a company's performance might be provided by financial gearing. It is positive when the cost of debt is lower than return on assets. It is worth pointing out that many firms are considered as underleveraged, these companies may increase the debt with quite a low cost in order to generate higher income (Eckbo, 2007).

The ratio analysis, which usually contains liquidity, profitability and indebtedness analysis, is based on the relative (in the form of fractions) measurement of specific quantities. It is a generally used kind of financial analysis especially due to its simplicity and speed of analysis. Common knowledge of financial indicators and their availability to comparison over time are also not insignificant advantages (Gabrusewicz, 2014). Financial ratios are also useful in the context of comparing the company's situation with the industry in which it operates. Taking this into account, they are often used in practice.

3. Dependencies among groups of indicators

Relationships between indicators from different groups might be calculated by using statistical tools. One of the ways for measuring these dependencies is the analysis of correlation (Andrzejewski and Mazur-Maślanka, 2017). First, however, before empirical analysis, it is meaningful to concentrate on the results of previous research in the area. It is worth noting that most of the studies were focused on relationships between two groups of indicators—liquidity and profitability, liquidity and indebtedness or profitability and indebtedness.

3.1. Liquidity and profitability

The relationship between liquidity and profitability can usually be twofold. It seems, however, that the belief that correlation between liquidity and profitability is negative is a dominant one. It is pointed out that the achieved short-term profit is most often used as a source of receivables financing, not being a source of cash financing (Jaworski, Czerwonka and Mądra-Sawicka, 2018). Enterprises with low stocks of liquid assets reduce the costs associated with their maintenance. This approach allows for higher profits, but is also associated with an increased risk of losing liquidity. Then again, companies focusing on maintaining proper financial liquidity engage additional financing for this purpose. It is usually associated with the freezing of capital in inventories or short-term receivables (Waściński and Kruk, 2010). What is more, according to K. Stępień (2012), overliquidity may lead to a decrease in income. Hence, to a decline in profitability. Similarly, T. Maślanka (2019) states that in the literature on the subject, opinions about the negative impact of liquidity on profitability are common.

However, empirical studies taking into account the relationship between liquidity and profitability led to different results. For example, research on the example of agricultural companies in Poland (Wasilewski and Felczak, 2011) and banks in Ghana (Lartey, Antwi and Boadi, 2013) showed a positive relationship between these measures. The existence of a strong positive dependence was pointed out also by T. Maślanka (2009). Similar results were obtained by G. Vintilă and E. Nenu (2016), whose research showed a positive link between return on assets and quick liquidity. Then again, the study conducted by T. Waściński and M. Kruk (2010) indicated a decrease in profitability as a result of an increase in the liquidity of the examined entities. An ambiguous relationship between profitability and liquidity was distinguished by Q. Saleem and R. Rehman (2011). These researchers indicated that the increase in ROA led to an increase in the liquid ratio, increase in ROE led to an increase in quick and current ratios, but increase in ROS led to decrease in current ratio. Another study, by D. Zawadzka, R. Ardan and E. Szafraniec-Siluta (2011), indicates that growing ROA results in improvement in quick ratio, while ROA has a negative impact on that measure of liquidity. Further, J. Jaworski, L. Czerwonka and M. Mądra-Sawicka (2018) pointed out that there was no significant relationship between profitability and liquidity. Consistent results were obtained by T. Maślanka (2019), for most of the entities analyzed. M. Rehman, M. Khan and I. Khokhar (2015) also reached similar conclusions. The result of their study showed no statistically significant dependence in 5 out of 6 cases. Taking into account the relationship between indicators such as Return on Equity (ROE), Return on Assets (ROA) and ratios referring to liquidity—Quick Ratio (QR), Current Ratio (CR) and Cash Ratio (CAR), only between ROA and CR it was indicated that the variables were positively related. Based on the results of the signalled studies, no positive or negative relationship between liquidity and profitability can be clearly stated.

3.2. Liquidity and indebtedness

Liquidity is strongly connected with current liabilities. When their level is growing, it might be more difficult to maintain stable liquidity. Then it is necessary for current assets to grow to negate the effect of risen liabilities. Maintaining financial liquidity at an appropriate level can be considered a manifestation of the ability to pay liabilities. At the same time,

companies also need to take out short-term loans to cover liquidity shortages (Demirkol and Acigkoz, 2020). From this perspective, a negative relationship between indebtedness and liquidity seems to be expected. Typically, increases in liquidity appear to be associated with falling indebtedness. This direction of dependence was confirmed by N. Šarija and M. Harc (2012). According to the study conducted on the example of more than a thousand Croatian enterprises, there was an observable negative relationship between liquidity and leverage, and so indebtedness. The consistent result was obtained by P. Bórawski (2008) on the example of Polish farms and by J. Jaworski and L. Czerwonka (2018) on the example of several hundreds of business entities in the period 1998–2016. Also, J. Gryko (2011) indicated a negative correlation between the level of debt and financial liquidity among public companies. J. Bereźnicka (2011) obtained quite compliant results. Her research showed a negative dependence between current liabilities and liquidity. However, for liquidity and overall liabilities, there were no significant relationships.

The literature on the subject indicates that the relationship between debt and liquidity may also be positive. A higher level of liquid assets allows companies to incur larger liabilities, while at the same time providing a kind of collateral for them (Sibilkov, 2004). There are also empirical studies that do not confirm the existence of a negative relationship between liquidity and indebtedness. The analysis by Y. Hristozov (2020) is one of them. The author points out that on the basis of thousands of Bulgarian companies there are no significant dependencies between measures taken into account. Anderson (2002) indicated a positive relationship between liquid assets and long-term debt. Such dependence can be explained by the prudential motive in the company's activities. However, in general, empirical studies focusing on the relationship between liquidity and debt usually provided information about their negative correlation. Such a conclusion can be drawn both on the basis of analyses by foreign and Polish authors. Therefore, it seems that a negative relationship between these measures can be expected among companies listed on WSE.

3.3. Profitability and indebtedness

Dependencies between profitability and indebtedness are different. It is caused by the specificity of various kinds of debt, the ability to generate a financial surplus and the quality of company's management. The concept of financial leverage deserves attention in this context. According to it, an increase in indebtedness of a given enterprise may lead to changes in its profitability, especially in reference to shareholder's funds, and these changes might be both positive or negative. It depends, among other things, on the current level of indebtedness. If the increase in debt leads to an improvement/ declination in return on equity, a positive/ negative effect of financial leverage is observable (Czekaj and Dresler, 2005). Hence, it is unclear what relationship could be expected between profitability and indebtedness. Then again, dependencies between these measures might be explained by signalling theory, agency theory or tax theory. According to the first one, the existence of asymmetry of information may lead to a positive correlation between profitability and indebtedness. Referring to the agency theory, it can be said that there might be either a positive (agency cost of equity between shareholders and managers) or a negative (agency cost of debt between shareholders

and lenders) relationship. In reference to the tax theory, it is difficult to predict the direction of the dependence (Kebewar, 2013).

Previous research has provided empirical insight into dependencies between analyzed measures. The study by K. Mijić and D. Jakšić (2017) leads to the conclusion about the existence of a negative relationship between profitability and indebtedness. Similar findings based on the research were put forward by M. Shubita and J. Alsawalhah (2012) and M. Kebewar (2013). On the basis of their research, H. Habib, F. Khan and M. Wazir (2016) indicated an increase in the cost of debt servicing along with an increase in its level. This state of affairs led to a reduction in the profitability of the analyzed companies. Also, G. Vintila and E. Nenu (2016) indicated a negative correlation between the level of indebtedness of the enterprise and the return on equity. However, the results of studies based on the Polish market were different. A. Sajnóg (2010) stated that on the basis of Polish industrial companies, in many cases there is either a positive or a negative relationship between profitability and indebtedness. Therefore, it cannot be clearly stated what the average direction of this relationship is. Further, M. Jerzemowska and A. Hajduk (2015) pointed to the existence of a positive correlation between the analyzed measures in the case of commercial and service companies. In general, it seems that negative relationships dominate between these measures. However, the example of the Polish market is rather a different one. There seems to be a slightly positive dependency between these measures.

4. Research methods

The main objective of the research is to check how relationships between liquidity, profitability and indebtedness ratios are reflected in the reality of the Polish capital market. For this purpose, based on the literature review, the following hypotheses were formulated:

(H1) There is no significant positive or negative relationship between liquidity and profitability ratios.

(H2) There is a negative relationship between liquidity and indebtedness ratios.

(H3) There is a positive relationship between profitability and indebtedness ratios.

The study covers the period 2015–2019. The research was conducted on the example of companies listed in WSE (not only on the Main Market, but also on NewConnect). Most of the enterprises from the financial sector (especially banks) were excluded from the sample, particularly due to the different structure of their financial statements. Business entities were chosen because of their data availability (data were collected from the Orbis database: https://orbis.bvdinfo.com). Hence, the sample does not cover all companies, but most of them (more than 75% of publicly listed companies in Poland). The number of analyzed entities by years is presented below:

Table 1. Number of analyzed entities by years

	2015	**2016**	**2017**	**2018**	**2019**
Number of entities	638	661	662	644	630

S o u r c e: Author's own elaboration.

The research was focused on financial ratios. Three indicators from each group (liquidity, profitability, indebtedness) were selected. The list of them is presented below:

1) liquidity:
   – current ratio (CR);
   – quick ratio (QR);
   – cash ratio (CAR);
2) profitability:
   – return on assets (ROA);
   – return on equity (ROE);
   – return on sales (ROS);
3) indebtedness:
   – debt ratio (DR);
   – coverage of fixed assets with fixed capital (CFFC);
   – coverage of liabilities with cash surplus (CLCS).

Formulas used for computing financial ratios are as follows:

1) $CR = \frac{Current\ assets}{Current\ liabilities}$
2) $QR = \frac{Current\ assets - Stock}{Current\ liabilities}$
3) $CAR = \frac{Cash\ and\ equivalents}{Current\ liabilities}$
4) $ROA = \frac{Net\ income}{Assets}$
5) $ROE = \frac{Net\ income}{Shareholder's\ funds}$
6) $ROS = \frac{Net\ income}{Operating\ revenue}$
7) $DR = \frac{Liabilities}{Assets}$
8) $CFFC = \frac{Shareholder's\ funds + Non\text{-}current\ liabilities}{Fixed\ assets}$
9) $CLCS = \frac{Net\ income + Depreciation + Amortization}{Liabilities}$

As for the liquidity ratios, desirable value ranges can usually be found in the literature of the subject (for example—Czekaj and Dresler, 2005; Sierpińska and Jachna, 2004). For instance, the theoretical range for current ratio is [1,2;2], for quick ratio [1;1,2] and for cash ratio >0,2. When it comes to profitability ratios, they are stimulants—the higher their values, the better the company's ability to generate cash surpluses is assessed. In the case of indebtedness ratios, there can be found opinions that values not higher than 50% are appropriate for debt ratio. Coverage of fixed assets by fixed capital should be full (not lower than 100%). For CLCS, it is much more difficult to find the right range. It can be considered to be 0, indicating whether the entity is generating a cash surplus. Overall, however, it is worth mentioning that the desired values of given indicators significantly depend on the specificity of the activity of a given sector of the economy, or on the macroeconomic situation (Sierpińska and Jachna, 2004).

Due to the presence of numerous outliers, the analysis was performed after removing 5% of the lowest and 5% of the highest values for each indicator in a given year. In the beginning, descriptive statistics were calculated for ratios for individual years. However, for the purposes of this analysis, it is essential to measure dependencies among groups of indicators. Hence, correlation coefficients between liquidity, profitability and indebtedness ratios were computed further. The analysis was performed using the Statistica software.

5. Empirical analysis

Initially, the focus was on descriptive statistics for individual indicators, broken down by year. It has been shown in Tables 2–6.

Table 2. Descriptive statistics for ratios from 2015[1]

	Min	Max	Mean	St. dev.	Coef. var.	Q1	Q2	Q3
CR	0.29	9.34	1.93	1.53	79.06%	1.03	1.45	2.25
QR	0.20	8.75	1.51	1.46	96.96%	0.82	1.07	2.05
CAR	0.00	3.37	0.43	1.18	274.14%	0.18	0.18	1.25
ROA	–69.14%	17.59%	–0.39%	47.21%	–12,059.16%	1.06%	1.88%	17.36%
ROE	–133.52%	75.56%	5.19%	16.83%	324.25%	–2.70%	5.79%	9.14%
ROS	–694.59%	37.81%	–17.38%	61.03%	–351.06%	–2.66%	2.19%	10.67%
DR	9.30%	103.54%	49.28%	69.06%	140.14%	2.16%	47.67%	47.96%
CFFC	20.72%	1480.85%	193.50%	156.94%	81.11%	47.12%	126.76%	127.15%
CLCS	–99.24%	96.87%	12.23%	168.80%	1380.14%	10.93%	11.59%	129.35%

S o u r c e: Author's own elaboration.

Table 3. Descriptive statistics for ratios from 2016

	Min	Max	Mean	St. dev.	Coef. var.	Q1	Q2	Q3
CR	0.22	11.54	2.03	1.83	89.82%	1.01	1.42	2.33
QR	0.17	9.48	1.58	1.74	110.36%	0.81	1.05	2.02
CAR	0.00	3.60	0.44	1.37	312.81%	0.18	0.17	1.24
ROA	–52.86%	17.68%	–1.30%	50.42%	–3884.13%	0.81%	1.31%	16.00%
ROE	–115.70%	65.96%	2.07%	18.73%	905.34%	–3.79%	4.48%	8.42%
ROS	–495.25%	38.58%	–16.19%	49.92%	–308.27%	–5.11%	1.58%	10.10%
DR	7.55%	115.52%	50.26%	59.39%	118.16%	1.58%	49.60%	49.82%
CFFC	–118.33%	1454.58%	204.96%	177.29%	86.50%	46.33%	127.17%	128.19%
CLCS	–99.34%	112.67%	9.73%	190.10%	1953.26%	9.10%	10.06%	130.33%

S o u r c e: Author's own elaboration.

Table 4. Descriptive statistics for ratios from 2017

	Min	Max	Mean	St. dev.	Coef. var.	Q1	Q2	Q3
CR	0.18	11.12	2.02	1.86	92.17%	0.96	1.45	2.25
QR	0.11	9.28	1.52	1.72	113.46%	0.77	1.01	1.98
CAR	0.00	4.59	0.48	1.32	272.10%	0.17	0.19	1.27

[1] Q1, Q2, Q3—in sequence: quartile 1, 2 (median), 3; St. dev.—standard deviation; Coef. var.—coefficient of variation (the following tables use analogous markings).

	Min	Max	Mean	St. dev.	Coef. var.	Q1	Q2	Q3
ROA	–254.99%	16.60%	–2.87%	59.87%	–2082.78%	0.68%	1.20%	17.17%
ROE	–198.60%	85.64%	3.26%	20.98%	642.74%	–3.54%	5.44%	8.75%
ROS	–598.93%	36.00%	–20.75%	60.84%	–293.18%	–4.84%	1.68%	10.45%
DR	8.25%	165.69%	52.98%	70.98%	133.98%	1.67%	50.45%	50.53%
CFFC	–67.44%	1954.98%	204.14%	185.35%	90.79%	46.98%	128.56%	129.89%
CLCS	–81.43%	105.78%	9.91%	198.59%	2004.35%	8.34%	8.73%	131.39%

S o u r c e: Author's own elaboration.

Table 5. Descriptive statistics for ratios from 2018

	Min	Max	Mean	St. dev.	Coef. var.	Q1	Q2	Q3
CR	0.05	11.53	1.99	1.93	97.21%	0.97	1.36	2.15
QR	0.05	9.59	1.48	1.79	120.79%	0.71	1.00	1.90
CAR	0.00	5.01	0.46	1.37	300.93%	0.14	0.15	1.20
ROA	–72.31%	18.20%	–3.22%	62.48%	–1938.98%	0.76%	1.25%	15.09%
ROE	–200.00%	70.76%	0.90%	23.80%	2648.15%	–4.09%	5.28%	8.77%
ROS	–676.67%	75.21%	–29.71%	80.73%	–271.71%	–4.90%	1.66%	10.03%
DR	7.92%	204.72%	54.60%	90.20%	165.20%	1.63%	51.85%	51.87%
CFFC	–60.60%	4480.75%	197.66%	198.38%	100.36%	48.42%	127.15%	132.63%
CLCS	–93.13%	97.73%	9.69%	211.59%	2184.58%	8.70%	9.15%	132.21%

S o u r c e: Author's own elaboration.

Table 6. Descriptive statistics for ratios from 2019

	Min	Max	Mean	St. dev.	Coef. var.	Q1	Q2	Q3
CR	0.18	11.12	1.95	1.75	98.70%	0.93	1.39	2.30
QR	0.11	8.80	1.49	1.66	111.36%	0.71	0.99	1.99
CAR	0.01	3.69	0.43	1.31	300.93%	0.16	0.16	1.23
ROA	–74.10%	22.23%	–2.51%	54.22%	–2161.67%	1.01%	1.66%	17.34%
ROE	–103.15%	82.90%	3.77%	21.42%	568.80%	–3.32%	5.50%	9.23%
ROS	–425.23%	54.98%	–13.69%	46.29%	–338.14%	–4.12%	2.09%	10.84%
DR	7.65%	220.22%	55.88%	59.13%	105.81%	2.09%	53.05%	53.25%
CFFC	–146.39%	1920.59%	205.29%	192.29%	93.67%	47.73%	125.39%	130.88%
CLCS	–91.37%	216.28%	12.55%	206.18%	1643.50%	10.43%	11.12%	129.45%

S o u r c e: Author's own elaboration.

Descriptive statistics for the liquidity ratios were at a similar level in each of the years 2015–2019. This indicates a fairly stable situation in terms of covering current liabilities with liquid funds among the analyzed companies. In the case of the current ratio, the variation in the value of this ratio was one of the smallest in the sample. The mean value indicates that the value is near the high end of the theoretically valid range. However, on the basis of quartiles, over 25% of the analyzed companies struggle with liquidity shortage, and over 25% with overliquidity. Similar conclusions can be drawn from the quick ratio. As for the cash ratio, less than half of the entities reach the level recognized as correct in the literature of the subject. However, entities that are in the minority are characterized by an average significant cash overliquidity. Overall, in terms of liquidity, analyzed companies are fairly average.

At first, regarding profitability indicators, it is worth noting that the differences in signs between the chosen statistics on ROA, ROE, and ROS (for instance in the case of the mean and quartile 1) result from the removal of outliers in the sample, as mentioned earlier. It is also important that in some cases ROE distorts the picture (e.g. for the generated profit with negative equity, the value of the ratio is negative, and for the net loss through the prism of negative equity—positive). The profitability ratios are significantly diversified. The means for ROA and ROS take negative values, however the corresponding medians are positive. This indicates the presence of units that incurred very significant net losses in relation to the sum of assets or sales revenues (which is also confirmed, among others, by the minimum values for ROS in individual years). However, for each of the analyzed years, the number of entities generating a positive financial result (according to ROA, it was over 75% of the analyzed enterprises) exceeded the number of companies incurring losses. More than half of analyzed business units generated net profits corresponding to at least 1% of total assets or turnover. Such results allow the profitability of companies listed on the WSE to be considered slightly positive on average.

Indices relating to indebtedness are characterized by similar values of descriptive statistics in subsequent years. In the case of the debt ratio, it is relatively low, for most companies. In total, nearly 75% of entities are characterized by debt not exceeding 50% of assets, considered quite safe in the literature on the subject. The maximum value of this ratio above 100% indicates, however, the existence of companies whose liabilities value exceeds the value of assets, therefore equity is negative. This proves their bankruptcy in the economic sense. In most cases, the coverage of fixed assets with capital employed is full (the ratio's values then exceed 100%). However, over 25% of entities have less than 50% coverage of their fixed assets, which may cause problems in their business operations in the future. Cash surplus was generated by over 75% of entities in each year of the analysis. It made it possible to cover liabilities and related payments to varying degrees. In some cases, however, cash deficiencies were close to the value of liabilities, which indicated significant losses among such entities. In general, indebtedness indicators can be assessed rather positively among the analyzed companies.

Summing up, it is also worth noting that the study covered various sectors of the economy, which undoubtedly influenced the diversification of the results. This conclusion can also be applied to the correlation analysis, which is the next part of the study.

In the following part of the analysis, attention was drawn to the relationship between the liquidity, profitability and indebtedness ratios. Correlation matrices showing such relationships are presented in Tables 7–11.

Table 7. Correlation matrix for ratios from 2015[2]

	CR	QR	CAR	ROA	ROE	ROS	DR	CFFC	CLCS
CR	1.000								
QR	0.758**	1.000							
CAR	0.473**	0.627**	1.000						
ROA	0.171**	0.118*	0.107	1.000					
ROE	0.088	0.068	0.062	0.904**	1.000				
ROS	0.062	–0.011	–0.032*	0.591**	0.553**	1.000			
DR	–0.406**	–0.339**	–0.310**	–0.075*	0.093	0.014	1.000		
CFFC	0.464**	0.377**	0.253**	0.136**	0.135**	0.087	–0.015*	1.000	
CLCS	0.272**	0.239**	0.19**	0.684**	0.499**	0.476**	–0.376**	0.102	1.000

S o u r c e: Author's own elaboration.

Table 8. Correlation matrix for ratios from 2016

	CR	QR	CAR	ROA	ROE	ROS	DR	CFFC	CLCS
CR	1.000								
QR	0.848**	1.000							
CAR	0.608**	0.655**	1.000						
ROA	0.087*	0.040*	0.059	1.000					
ROE	0.068	0.030	0.046	0.899**	1.000				
ROS	0.012	–0.031	–0.005*	0.609**	0.529**	1.000			
DR	–0.429**	–0.359**	–0.351**	–0.003*	0.024	0.068	1.000		
CFFC	0.399**	0.346**	0.222**	0.109*	0.096*	0.014	–0.023*	1.000	
CLCS	0.149**	0.126**	0.187**	0.778**	0.603**	0.53**	–0.254**	0.045	1.000

S o u r c e: Author's own elaboration.

Table 9. Correlation matrix for ratios from 2017

	CR	QR	CAR	ROA	ROE	ROS	DR	CFFC	CLCS
CR	1.000								
QR	0.784**	1.000							
CAR	0.610**	0.693**	1.000						
ROA	0.128**	0.100*	0.090	1.000					

[2] *; **—in sequence: statistically significant at $p<0.05$; $p<0.01$ (the following tables use analogous markings).

	CR	QR	CAR	ROA	ROE	ROS	DR	CFFC	CLCS
ROE	0.104	0.086	0.068	0.886**	1.000				
ROS	0.013	–0.021	–0.006*	0.565**	0.509**	1.000			
DR	–0.450**	–0.368**	–0.359**	–0.052*	0.022	0.015	1.000		
CFFC	0.439**	0.325**	0.222**	0.096*	0.096*	0.088	–0.065*	1.000	
CLCS	0.182**	0.208**	0.159**	0.776**	0.586**	0.493**	–0.302**	0.008	1.000

S o u r c e: Author's own elaboration.

Table 10. Correlation matrix for ratios from 2018

	CR	QR	CAR	ROA	ROE	ROS	DR	CFFC	CLCS
CR	1.000								
QR	0.778**	1.000							
CAR	0.559**	0.663**	1.000						
ROA	0.085*	0.008*	–0.003	1.000					
ROE	0.061	0.008	0.017	0.830**	1.000				
ROS	0.014	–0.037	0.043*	0.469**	0.413**	1.000			
DR	–0.434**	–0.368**	–0.390**	–0.102*	–0.109	–0.005	1.000		
CFFC	0.498**	0.504**	0.427**	0.078*	0.035*	0.011	–0.126**	1.000	
CLCS	0.215**	0.089*	0.097*	0.775**	0.561**	0.447**	–0.318**	0.065	1.000

S o u r c e: Author's own elaboration.

Table 11. Correlation matrix for ratios from 2019

	CR	QR	CAR	ROA	ROE	ROS	DR	CFFC	CLCS
CR	1.000								
QR	0.832**	1.000							
CAR	0.579**	0.665**	1.000						
ROA	0.130**	0.096*	0.064	1.000					
ROE	0.085	0.051	0.021	0.654**	1.000				
ROS	0.011	–0.024	–0.144**	0.507**	0.391**	1.000			
DR	–0.556**	–0.467**	–0.334**	–0.193**	–0.035	–0.011	1.000		
CFFC	0.474**	0.354**	0.235**	0.158**	0.124**	0.084	–0.153**	1.000	
CLCS	0.268**	0.277**	0.219**	0.716**	0.492**	0.422**	–0.395**	0.084	1.000

S o u r c e: Author's own elaboration.

The presented correlation matrices indicate similar values observed between individual indicators in the subsequent years of the analysis. If the linear relationships were statistically

significant in 2015, they were also statistically significant in the following years of the study at $p < 0.05$ (although the correlation between ROS and CAR took different signs).

A positive correlation of considerable strength was observed between the ratios of current and quick liquidity and return on assets. In the case of ROS and cash ratio indicators, their correlation in the analyzed sample turned out to be negative. On the basis of these results, it can be concluded that the hypothesis about the lack of statistically significant relationships between the measures of liquidity and profitability is partially reflected in the reality of the Polish capital market—6 out of 9 correlations were not statistically significant, while the others, mentioned above, led to different conclusions.

All of the liquidity ratios taken into account showed a significant negative correlation with the company's indebtedness level, which is reflected in the debt ratio. Then again, the correlation coefficients between the CR, QR, CAR and CFFC and CLCS indices were positive. Companies whose liquidity increases, finance their fixed assets to a greater extent with fixed capital. Conversely, generating a cash surplus favours, on average, an increase in liquidity among the analyzed entities.

A statistically significant correlation can be seen between ROA and DR. On the basis of these observations, it can be concluded that the increase in debt reduces the average profitability of the company, the negative effect of financial leverage is materializing. The coverage of fixed assets with fixed capital is significantly positively correlated to the ROA and ROE ratios. The higher the average profitability of a given entity, the more secure the entity's long-term financial situation. The coverage of liabilities with cash surplus also shows a significant, positive linear relationship with profitability ratios, which is not surprising as one of the components shaping the cash surplus is net profit. In the light of these results, the hypothesis relating to the negative correlation between profitability and debt indicators seems to be partially empirically confirmed (it concerns especially the level of debt, which is illustrated by the DR measure).

6. Summary

The literature review shows that there are often ambiguous potential dependencies between liquidity, profitability and indebtedness ratios. The empirical study conducted as part of this analysis, aimed at verifying the relationship between the title measures on the example of the Polish capital market, led to the following conclusions:

1) Most of the analyzed entities are characterized by liquidity at quite a safe level, often even overliquidity. The distribution of cash ratio values was, however, slightly different—more than half of analyzed companies have their values below theoretically safe level. Conversely, it is crucial to note that values of liquidity ratios are highly diversified due to industries.
2) The majority of enterprises taken into account were generating financial surplus. This may indicate the ability of these entities to cover their liabilities, develop a business or pay dividends to shareholders.
3) Analyzed companies are on average characterized by a medium level of indebtedness. However, for almost 75% of entities, their fixed assets were fully covered by fixed cap-

ital. What is more, coverage of liabilities by financial surplus was also on a positive, satisfying level, on average. The companies, despite moderate indebtedness, generated cash surpluses, allowing for gradual debt repayment.

4) Dependencies between profitability and liquidity are varied. On average, there was no significant correlation between these measures (there were some, although its signs were different). This result of the study is confirmed by previously mentioned research (for instance Maślanka, 2019; Rehman, Khan and Khokhar, 2019).
5) Relationships between liquidity and indebtedness are rather negative (taking DR into account). Growing debt may seriously affect a company's ability to pay its current liabilities, and it is true for a part of enterprises taken into account in the research. The study result confirms the outcome of the research by N. Šarija and M. Harc (2012) and J. Gryko (2011).
6) Most of the cases of companies are generating negative effects of financial leverage. An increase in debt is not reflected in the growth of profitability. It might be caused for instance by a too high level of existing debt of these companies or by the high cost of debt service. These conclusions are consistent with the results of studies conducted by most of the authors mentioned (for example Shubita and Alsawallah, 2013; Kebewar, 2017) but contrary to the Polish ones (Sajnóg, 2010; Jerzemowska and Hajduk, 2015).

In general, the results presented above might have some practical implications. Managers, aware of the average negative effect of financial leverage among Polish listed companies, may be willing to more accurately analyze potential sources of financing, for example in terms of the cost of servicing them, but also the possibility of modifying the arrangements. Further, the lack of an unequivocal relationship between liquidity and profitability may indicate a significant differentiation among companies—some of them accumulate cash surpluses, increasing liquidity, while others get rid of funds, which often exposes them to liquidity shortage. A company's policy of allocating financial surpluses can provide valuable information about future opportunities and threats to its business. Negative relationships between indebtedness and liquidity indicate that the analyzed economic units repay their debts in the event of overliquidity, so they operate in accordance with the assumption of rationality. However, when the level of debt rises, it may cause some problems in keeping liquidity at a safe level, what managers should take into account.

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Zależności pomiędzy wskaźnikami finansowymi na Giełdzie Papierów Wartościowych w Warszawie

Abstrakt: Zależności między wskaźnikami płynności, rentowności i zadłużenia są zwykle dość niejasne. Wiele analiz empirycznych dostarcza wglądu w tę kwestię. Jednak wyniki takich badań są zróżnicowane i często niespójne. Wobec tego zdecydowano się zweryfikować relacje pomiędzy tytułowymi grupami wskaźników, biorąc pod uwagę polski rynek kapitałowy. Metodologia badania obejmowała przede wszystkim przegląd literatury i analizę danych (z użyciem statystyk opisowych i korelacji). W próbie badawczej uwzględniono większość spółek notowanych na Giełdzie Papierów Wartościowych w Warszawie, obejmowała ona lata 2015–2019. Na podstawie tej analizy wysnuto poniższe wnioski. W odniesieniu do wskaźników płynności warto zwrócić uwagę, że ich wartości są silnie zróżnicowane. Przeciętnie wydaje się, że analizowane podmioty charakteryzowały się dość bezpiecznym poziomem płynności. Większość jednostek generowała też dochód (ponad 60% przypadków). Poziom ich zadłużenia był przeciętny, ale wskaźniki pokrycia kształtowały się zazwyczaj na w pełni zadowalającym poziomie. Relacje pomiędzy wskaźnikami płynności i rentowności były zróżnicowane, nie było między nimi istotnej korelacji. Średni wzrost rentowności / płynności prowadził zaś do nieznacznie ujemnych lub żadnych istotnych zmian w płynności / rentowności. Zależność między rentownością a zadłużeniem była natomiast raczej ujemna. Podobnie ujemną korelację zaobserwowano w przypadku płynności i poziomu zadłużenia.

Słowa kluczowe: wskaźniki finansowe, płynność finansowa, rentowność, zadłużenie

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The attractiveness of the rural tourist product on the example of the trail "Lesser Poland Village Fragrant with Herbs"

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Abstract: The purpose of this publication is to identify and evaluate the attractiveness of the rural tourism product in Poland. As an example to achieve the goal, a thematic trail was chosen, the leitmotif of which is inextricably linked with the village—"Lesser Poland Village Fragrant with Herbs". The topic concerns an interesting, but at the same time little known, innovative tourist product in Poland and abroad. Thematic routes constitute a coherent and attractive offer for tourists. Promotion of cultivation and gastronomy based on dishes from herbs, as well as cooperation of agritourism farms in this area can bring tangible benefits both for themselves and for tourists. The thesis put forward in the paper is the statement that the cooperation of farms within the "Lesser Poland Village Fragrant with Herbs" trail may be a significant stimulus in improving their attractiveness and market position as well as diversifying the tourist product. The research results positively verify the thesis. The functioning of the trail significantly affects the market position of the member farms, improving the quality of their operation and professionalism. The article was created using compact books, magazines, as well as netographic information and an interview with selected agro-hosts and the director of the organization responsible for establishing the trail. The research method used in the publication is the analysis of existing data and an interview with the director of the SOT office and selected owners of the member farms of the discussed route.

Keywords: agribusiness, agritourism, promotion, entrepreneurship, tourism

1. Introduction

Today, tourism is a real phenomenon on a global scale. The number of participants in the global tourism movement amounted to 1.5 billion people in 2019 alone, which accounted for approximately 19% of the world's population. The characteristic features of tourism are the variety of forms and motives for its cultivation. The year 2020 has unfortunately brought a radical change in long-term positive development trends. The global Covid-19 pandemic and related

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restrictions have hit global tourism particularly hard. There was a marked decrease in the number of tourists, trips and overnight stays, as well as the level of tourism income and expenses. It is to be expected that it will take the next few years to make up for the losses incurred by the tourism industry.

Among the many forms of tourism, rural tourism or agritourism deserve special attention. Spending time in rural areas, using traditional gastronomy, contact with farm animals or participating in field work is a variety of leisure activities for many tourists.

The development of agritourism in Poland is the result of the growing demand from tourists, as well as the interest in this form of economic activity among rural residents. For many agro-hosts, it is a major or significant additional source of income. Like many other sectors of the economy, its rational development is based on innovation and entrepreneurship. Hence, apart from individual farms, there are also tourist routes on the market based on cooperating agri-farms.

The aim of this publication is to identify and evaluate the tourist product created by an organized group of agritourism farms. The innovation and competitiveness of the tourist offer of the thematic trail in Lesser Poland, "Lesser Poland Village Fragrant with Herbs", was assessed.

The thesis put forward in the work is the statement that the cooperation of farms as part of the "Lesser Poland Village Fragrant with Herbs" trail is an important element in the development of their attractiveness, quality and enrichment of the rural stay offer.

The article was created thanks to the use of compact books, magazines, netography, telephone conversations with people involved in the creation of the tourist trail, as well as with some agro-hosts.

The research method of the publication is the analysis of existing data and a telephone interview with the office director of the Regional Tourist Organization in Nowy Sącz and selected owners of agritourism farms on the route in the form of open questions.

2. Agritourism and its situation in Poland

The concept of agritourism can be defined in various ways. According to M. Drzewiecki, agritourism is a form of recreation taking place in rural farms of an agricultural nature, based on the accommodation base and recreational activities related to the farm or equivalent and its surroundings (natural, production and service) (Drzewiecki, 2002, p. 27). In turn, M. Dębniewska defines agritourism as a type of tourism that takes place in agricultural areas, using free premises after adaptation, farm buildings and the production and services of their owners (Dębniewska and Tkaczuk, 1997, p. 17).

A term related to agritourism is *agritourism*, which consists in the active participation of the immigrant population, domestic and foreign tourists in various manifestations of the socio-cultural life of the countryside (Kowalczyk, 1993, p. 5).

Contemporary agritourism meets modern trends in tourism, which are described by characteristic features:

– looking for rest in quiet and peaceful places;
– willingness to learn about a new tourist product;

– looking for a cheap and attractive place to spend free time;
– striving for close knowledge and contact with nature and culture (Jędrysiak, 2010).

Agritourism can contribute to generating benefits for both rural areas and tourists. Among the most important benefits for the countryside resulting from agritourism are:
– creating new jobs and income opportunities in areas directly and indirectly related to agritourism;
– improvement and revitalization of rural infrastructure and increased aesthetics;
– vocational activation of rural residents and reduction of unemployment;
– preserving the heritage and cultural heritage of the countryside;
– improvement of the level and standards of living in the countryside;
– promotion of areas and attracting new investors;
– more effective adaptation of rural residents to new conditions and playing new social roles (Sznajder and Przezbórska, 2005).

The most important benefits of agritourism for tourists include:
– the opportunity to get to know rural areas and their specific functioning;
– direct contact with nature and an active way of spending free time;
– close contact with folklore, culture and gastronomic products;
– getting to know rural life, the countryside, its inhabitants, contact with animals or agricultural production;
– shaping the attitude of tolerance towards different views and behaviours (Knecht, 2009, pp. 25–26).

The beginnings of organized leisure in rural areas in Poland can be traced back to the nineteenth-century regional movements promoting local economic and cultural initiatives (Drzewiecki, 1997, p. 23). However, the real fashion for trips and spending time in the countryside in Poland fell on the period of the interwar period. On a national scale, 792 summer resorts were already operating in the provinces located within the borders of Poland, with 209,065 people staying there. During this period, the first local organizations coordinating recreation in the countryside also appeared, e.g. the Tourist Cooperative "Gromada". In the post-war period, the development of rural tourism began to intensify after 1957. As part of "holidays under the pear tree", summer holidays began to be organized (Krynica, Muszyna, Tuchola Forest). The Employee Holiday Fund, operating since 1949, introduced recreation in rural areas as part of the tourist offer (http://www.fwp.pl/, 2020).

The peak development of post-war agritourism was in the 1980s, when it became a widespread field of personal social services. Then again, since the 1990s, an increase in the tendency towards the creation of local agritourism associations, thematic routes and villages as well as other initiatives can be observed (Babuchowska and Arażna, 2011, p. 12). The situation of contemporary Polish agritourism based on the available statistical data is presented in Table 1.

Table 1. Agritourism accommodation in Poland in 2011–2019

Year	2011	2012	2013	2014	2015	2016	2017	2019
Number of accommodation units	582	683	800	804	811	802	746	743
Number of places in the accommodation units	9281	11,124	12,771	12,810	13,351	13,526	13,102	13,208
Number of tourists in the accommodation units	72,020	109,560	108,100	111,100	127,100	138,800	132,300	156,600
Number of overnight stays in the accommodation units	328,600	392,182	370,600	384,800	452,100	452,100	537,000	571,000

S o u r c e: Author's own elaboration based on GUS data.

The data contained in Table 1 show clear fluctuations in the basic indicators of the development of agritourism in Poland in the period under consideration. Until 2015, all the presented indicators showed an upward trend. Since 2016, there has been a decline in the number of accommodation units, as well as, in principle, the number of places in the accommodation units. However, after the unsuccessful 2017, the number of agritourists and the number of overnight stays in accommodation increased.

The Polish Federation of Rural Tourism "Guest Farms" (http://www.pftw.pl/, 2020), established in 1996 in Nałęczów, deals with the development of agritourism and rural tourism.

The Federation patronizes 33 local and regional organizations that associate rural tourism facilities. Its aim is to conduct comprehensive activities for the promotion and development of Polish rural tourism. The statutory assumptions are implemented through continuous training, publications and promotions in the mass media (Sikora, 2012).

One of the main tasks of the Polish Federation of Rural Tourism "Guest Farms" is the categorization of the Rural Accommodation Base—that is, voluntary evaluation of rural tourism facilities, carried out by licensed inspectors. The purpose of the categorization is to improve the quality of services provided by rural tourism facilities to recommend and promote them. Through its activities, the Federation wants to develop a positive image of recreation in the countryside and promote recreation in the bosom of nature (Wojciechowska, 2018).

3. Agritourism in the Lesser Poland Voivodeship

The Lesser Poland Voivodeship has excellent conditions for alternative tourism, including rural tourism and agritourism. The tourist attractiveness of the Lesser Poland region is related to the existing tourist values and related recreational opportunities as well as transport accessibility (Krasnowolski, 2012).

Natural areas are especially valuable for rural tourism in Lesser Poland. These are i.a. mountains: Tatra, Gorce, Pieniny, Beskids. The vicinity of the mountains allows tourists resting on agritourism farms to do mountain hiking. They also often use agritourism services in the lakeland areas. Attractive places for this form of recreation in Lesser Poland are, for example, on Lake Rożnów or Lake Czorsztyn. There is then the possibility of practicing water sports or fishing. In winter, tourists staying overnight in agritourism farms are often inter-

ested in practicing winter sports. Favourable conditions in this respect are especially found in the rural areas of Podhale (e.g. Kościelisko, Białka Tatrzańska, Poronin) (Bański, 2017).

The development of agritourism in Lesser Poland is also fostered by transport accessibility (Lijewski, Mikułowski and Wyrzykowski, 2008). First of all, it is necessary to mention the existing condition of the roads, which in the first place determine the accessibility to tourist farms. Due to the fact that most agritourists use their own means of transport, the modernization of road trails plays an important role here. In addition to the A4 motorway, the main access roads to agri-farms are S7 (under modernization) and DK75.

Convenient conditions for the development of rural tourism in Lesser Poland affect the state of development of agritourism accommodation, as shown in Table 2.

Table 2. Number of lodgings and beds in the Lesser Poland voivodeship and the national average

Year	2011	2012	2013	2014	2015	2016	2018	2019
Number of agritourism lodgings/ national average	52/36	67/43	90/50	100/50	96/51	89/50	83/49	80/47
Number of beds in agritourism lodgings/ national average	965/580	1111/695	1423/801	1557/801	1553/834	1466/845	1397/823	1457/858

S o u r c e: Author's own elaboration based on GUS data.

The analysis of the data contained in Table 2 shows that by 2011 the number of accommodation units, as well as the number of accommodation places in agritourism accommodation in Poland and in Lesser Poland itself, was systematically increasing. However, since 2015 this trend (except for Lesser Poland) has been reversed. In 2019, only the number of beds in the accommodation increased. However, both presented indicators in the discussed region clearly exceed the national average, which proves the high position of Lesser Poland on the national map of agritourism development.

The favourable situation of Lesser Poland agritourism is supported by the competitiveness of the rural tourist offer. Achievements such as numerous theme villages, ecovillages or rural eco-museums should be mentioned here. In addition, numerous local gastronomic products should be added (e.g. oscypek [quark], plum brandy, carp from Zator) (Majewski, 2012).

An important role is also played by the mobilization of joint activities of individual agritourism farms, triggering the synergy effect. An expression of such activities is the opening of new, original tourist routes related to agritourism. An example of such activity is the trail "Lesser Poland Village Fragrant with Herbs".

4. "Lesser Poland Village Fragrant with Herbs"

The "Lesser Poland Village Fragrant with Herbs" trail was created on the initiative of the local tourist promoter—the Regional Tourist Organization in Nowy Sącz and the authorities of the Lesser Poland Voivodeship. According to Bożena Srebro, office director of the Regional Tourist Organization in Nowy Sącz, the main idea was to promote the charms of the

Lesser Poland countryside, its multiculturalism, and the diversity of regional cuisine with the use of slowly growing herbs and herbs grown in herbal gardens. The idea was a response to European trends in the development of agritourism, characterized by the specialization of the rural tourism product (especially noticeable in Germany, Austria and France) (http://www.sot.org.pl/, 2019).

The distinguishing feature of the discussed tourist product is simplicity, authenticity and return to tradition. The trail was created in 2009 and it is currently 254.5 kilometres long. Agri-farms included in the trail are located mainly in the southern part of the Lesser Poland Voivodeship. Most of them are located in the areas of the Beskid Sądecki and the Low Beskids which are particularly attractive for tourists. Currently, the trail includes 19 agri-farms. The agritourism farms included in the "Lesser Poland Village Fragrant with Herbs" tourist product are presented in Figure 1.

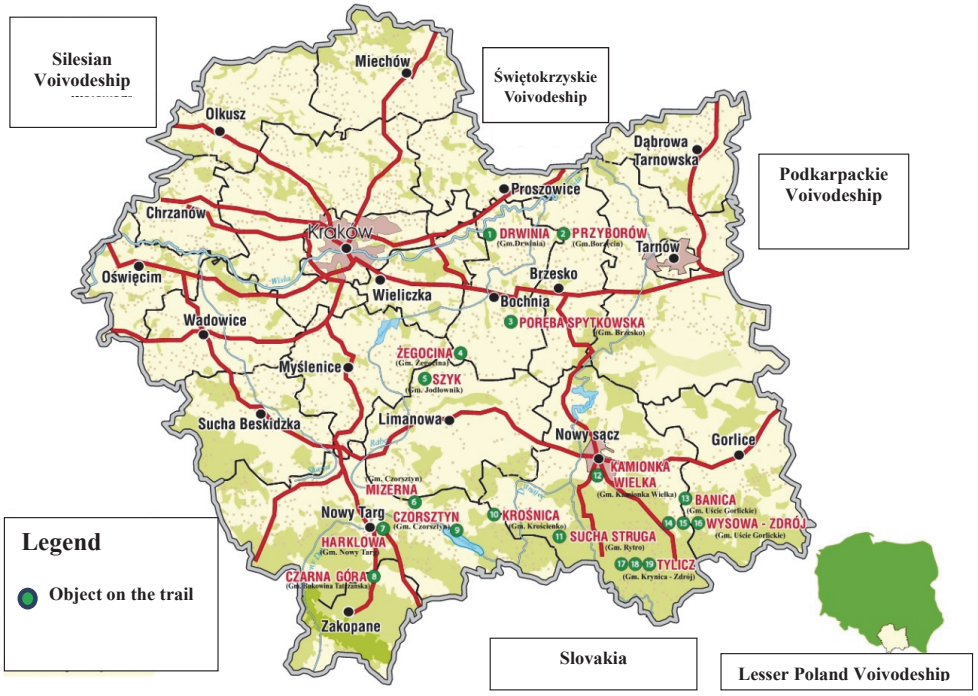

Figure 1. Map of the trail "Lesser Poland Village Fragrant with Herbs" in 2020

S o u r c e: http://www.sot.org.pl/index.php?p=1_9 [accessed: 2020-05-23].

The facilities on the "Lesser Poland Village Fragrant with Herbs" trail are well connected with each other and are located in places easily accessible by own means of transport. However, at the same time, their location on the outskirts of the village, in the vicinity of forests and meadows, provides peace and quiet as well as the opportunity to relax in the bosom of nature.

All 19 farms share certain characteristics. All of them have herb gardens and their hosts love to cultivate them. There are cultivated, among others, oregano, rosemary, mint, dandelion, lovage, coriander, lemon balm, sage, mint and lavender. In addition to the standard offer, these farms prepare syrups, preserves, tinctures and in many cases carry out biological regeneration treatments using herbs (http://www.sot.org.pl/index.php?p=1_9_Ma-opolska-wie-pachn -ca-zio-ami, 2019).

The number of member farms is limited. The Regional Tourist Organization in Nowy Sącz decides whether a farm may become a member of the trail in question. Guided by the quality criteria, unique farms are sought that stand out on the national agritourism map, with passion and willingness to cooperate with other entities. An expression of concern for the quality of the offer of member farms is the condition of the need for potential agro-hosts to undergo 2-stage preparatory training at the University of Agriculture in Krakow. After completing the training, the candidates receive the necessary knowledge about the cultivation of herbs, their types, uses and healing properties. They can also pass on their knowledge through training courses held in agri-farms for students interested in herbal issues.

Another aspect of the trail's functioning is the practical use of herbal issues. Each of the member farms, in addition to growing herbs, offers its tourists home-made regional cuisine made with herbs from the backyard gardens. The farms offer regional cuisine: Lemkos, Galician, Polish Uplanders, and Japanese.

Among the unique dishes on the trail, the most appreciated are: witch's soup, a drunk robber's bowl, the gift of life, literary tea, poverty soup, turnip soup, Pieniny delicacy, potato pie with herbs, heavenly flatbread, cheese with garlic and herbs, jellyfish, pickles, meats, tip of the gift of life, Galician cabbage with fatback, sinful lovage soup, tinctures, preserves, herbal syrups, etc. Each member of the trail also allows its customers to buy herbal souvenirs made by themselves and local folk artists. These can be herbal pouches, herbal pillows, caskets, herbal horoscopes, herbal spices or food preparations based on herbs. A pro-health offer is an extension of the gastronomic offer. The farms also offer wellness treatments with the use of herbs, herbal baths or treatments based on herbal products.

Another factor of competing for the discussed tourist product is the specificity in the approach to tourists. Instead of leaving their guests free to choose, they try to devote as much time as possible to them. Common time is used, among others in participation in herbalism classes, thanks to which guests are infected with herbal, ecological passions, at the same time cultivating cultural traditions.

The attractiveness of farms on the "Lesser Poland Village Fragrant with Herbs" trail has also an internal dimension. Farms closely cooperate with each other within the network product, thanks to which they can achieve great benefits. Among the most important, it is worth mentioning:

– distinguishing and emphasizing its presence on the national agritourism map;
– purchasing products from other organic farms (e.g. cheese, vegetables, fruit, fish) at bargain prices;
– mutual recommendation to clients of the stay offer and purchase of herbal souvenirs made in other farms on the trail;
– joint organization of events and cultural events (handicraft workshops, education, etc.).

The Regional Tourist Organization in Nowy Sącz, as the entity coordinating the functioning of the trail, took care of its extensive promotion through:

– participation in industry and international tourism fairs;
– broadcasting of advertising spots on TV or the Internet;
– presence on the air of the regional radio;
– stimulating the interest of journalists;
– publishing activities.

The key effects of Regional Tourist Organization in Nowy Sącz promotional activities include periodic scientific publications, training materials and promotional publications popularizing the values of the trail in question. Some publications reach abroad, some provide instructions on how to set up your own agritourism farm, its promotion or quality problems in running a business in the countryside. An additional effect of promotional activities is easier reaching wide groups of potential tourists with the collective offer (http://www.sot.org.pl/index.php?p=1_7_Publikacje, 2019).

The quality of the tourist product "Lesser Poland Village Fragrant with Herbs" can be measured by the number of awards and distinctions. The most important awards include the award of the Marshal of the Lesser Poland Voivodeship, the diploma of the Mayor of Brzesko in the category of artistic handicrafts and cuisine, a diploma of recognition of the Ministry of Labour and Social Policy for promoting folk traditions (http://www.sot.org.pl/index.php?p=) 1_19_Odznaczenia-SOT, 2019).

In addition to common features that connect all members of the "Lesser Poland Village Fragrant with Herbs" trail we can also distinguish features characteristic only for a given farm. The characteristic features of each member farm of the trail are presented in Table 3.

Table 3. Characteristics of agri-farms of the "Lesser Poland Village Fragrant with Herbs" trail

Name of the farm	Location	Categorization	Number of rooms/ beds	Specialization in agro-economy
"In Lumberjacks"	Drwinia	1 sun	5/13	Weaving, embroidery, lace, dishes based on herbs
"Forest Farm"	Przyborów	Lack of categorization	3/8	Dishes based on herbs – e.g. Gift of Life, Housewife, breeding of birds
"Artistic Farm"	Poręba Spytkowska	1 sun	4/8	Workshops of artistic handicraft from tissue paper, decoupage, salt mass, herbal dishes
"Łopusze"	Żegocina	3 suns	4/11	Workshops for creating decorative candles or paper-based, herb-based dishes
"Witch House in the Hills"	Szyk	Lack of categorization	3/7	Workshops on sculpture, ceramics, weaving, origami, hunting, herbal dishes e.g. Witch soup, Mice with sage, Green noodles, Literary tea
"At Kazakh's"	Mizerna	1 sun	7/12	Dishes based on herbs: Cabbage soup, Miserable Potato pancake with herbs

"Villa Akiko"	Harklowa	Lack of categorization	10/37	Japanese cuisine based on herbs: Katsudon cutlet, noodles with Nabeyaki Udon herbs
"Kneecap"	Sołtystwo	1 sun	3/9	Horse riding, herbal dishes, e.g. Nettle poor soup, Sourdough soup kneecap, Honey syrup with dandelion
Villa "Bright"	Czorsztyn	2 suns	3/9	Making and learning to make liqueurs based on herbs and fruits
"At Anna's"	Krośnica	1 sun	8/17	Learning to crochet, collect herbs, arrange bouquets, dishes based on herbs
Mountain hut "Cyrla"	Sucha Struga	2 suns	11/34	Breeding of bonsai trees, repair of old clocks, cultivation of herbarium, dishes based on herbs
"At Head Shepherd"	Kamionka Wielka	1 sun	4/10	Horse-drawn carriages, horseback, sculpturing, herbal cuisine
"Opalówka"	Banica	Lack of categorization	7/17	Farm animals, dishes based on herbs
"Ramis"	Wysowa Zdrój	Lack of categorization	10/21	Dishes of Lemko cuisine and herbs
"Juliet"	Wysowa Zdrój	2 suns	6/16	Own fishery trout, apiary, breeding hens, herbal dishes
"Sun"	Wysowa Zdrój	1 sun	3/7	Place for grilling, dishes based on herbs
"Agritourism Farm at Greg's"	Tylicz	3 suns	8/31	Animations, puppet theatre, feast by the fire, mountain stalking, aqua aerobics, herbal dishes
"At Christina and John's"	Tylicz	2 suns	5/18	Own ski centre, playground, barbecue gazebo, dishes based on herbs
"Under Spruce Trees"	Tylicz	1 sun	2/6	Barbecue, playground, dishes based on herbs

S o u r c e: Author's own elaboration based on data: http://www.sot.org.pl/web_documents/ziola_katalog.pdf.

The data contained in Table 3 clearly show the differentiation of agritourism farms included in the discussed trail in terms of the approach to categorization. In Poland, the categorization of an agritourism farm is voluntary, however, having a specific category (from 1 to 3 suns) is an expression of the efforts of the hosts for the level of services provided. In the list, 14 out of 19 agritourism farms have a categorization, while only the highest category is 3 suns. The most categorized farm has 1 sun.

According to Jadwiga Kica, the owner of the "In Lumberjacks" farm, the specificity of the offer of a given agritourism farm is conducive to increasing the marketability of its offer and it affects the interest of potential customers interested in a given type of activity.

Another element of differentiation concerns the size of agritourism farms of the discussed trail. Small farms with no more than 5 rooms and up to 18 beds are dominant. The list also includes two facilities that can be considered large (10 or 11 rooms and at least 30 beds).

Another factor determining the specificity of a given farm is its tourist offer. Despite the dominant theme of greenery in gastronomy, each farm has developed its own specific offer of dishes. In addition, individual farms try to attract tourists through their specific and unique offer.

Jadwiga Gas, the owner of the "Łopusze" farm, believes that the combination of the attractive location of her business, her own stay offer, as well as the natural and cultural values of the surroundings contribute to increasing the competitiveness of stays in the countryside.

Many farms focused on handicrafts, workshops and educational activities. Some farms offer contact with farm animals, their own hunting grounds, sports facilities and playgrounds for children.

Elżbieta Zając-Zbrożek is of the opinion that her agri-farm "Witch House in the Hills" is distinguished by an original, fairy-tale leitmotif, hunting cuisine and a rich offer of artistic handicraft workshops attracting new tourists.

One of the most innovative agritourism farms located on the trail is "Villa Akiko". The farm is run by a Japanese woman named Akiko Miwa who settled in Poland in 1989. The uniqueness of the farm's offer consists in combining Japanese and Polish culture in one place. The guests visiting this farm, in addition to the offer of herbs, have the opportunity to learn about the art of ikebana, put on a kimono or experience a tea ceremony (http://www.akiko.pl/, 2020). Akiko Miwa follows a specific Japanese approach to life in accordance with the principle of Total Ecological Lifestyle. She was also the initiator of the establishment of the "Rainbow" Polish-Japanese Association for the Regeneration of the Environment. Its purpose is to exchange experiences in the areas of culture, ecology and education (http://www.akiko.pl/o-mnie/, 2020).

5. Summary

Undoubtedly, the functioning of the "Lesser Poland Village Fragrant with Herbs" trail has a key impact on the attractiveness of agritourism and its products in the regional area. Due to its interesting and compact formula, it attracts tourists and extends the local offer of rural tourism, releasing many positive effects. The significant importance of the trail also consists in significantly influencing the qualifications of agro-hosts, stimulating the pursuit of increasing the quality of the tourist product or stimulating innovative activities. Noteworthy is the uniqueness of the tourist offer of the trail, which, despite the common theme, has many specific attractions to offer.

Due to the still uncertain and uncontrolled situation related to the Covid-19 pandemic, it is difficult to accurately estimate the losses incurred as well as to determine the future of domestic agritourism, including member agri-farms along the trail. This will require further research and analysis in the future. The directions of further research should concern, inter alia, ways of further development and reducing the negative impact of the environment on agritourism farms.

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Konkurencyjność wiejskiego produktu turystycznego na przykładzie szlaku „Małopolska Wieś Pachnąca Ziołami"

Abstrakt: Celem niniejszej publikacji jest identyfikacja i ocena atrakcyjności wiejskiego produktu turystycznego w Polsce. Jako przykład służący realizacji celu wybrano szlak tematyczny, którego motyw przewodni nierozerwalnie jest związany ze wsią – „Małopolska Wieś Pachnąca Ziołami". Temat dotyczy interesującego, a jednocześnie mało znanego w Polsce i za granicą nowatorskiego produktu turystycznego. Szlaki tematyczne stanowią bowiem spójną i atrakcyjną propozycję turystyczną dla turystów. Propagowanie uprawy oraz gastronomii na bazie potraw z ziół, a także współpraca gospodarstw agroturystycznych w tym zakresie może przynosić wymierne korzyści zarówno dla nich samych, jak i dla turystów. Tezą, jaką postawiono w pracy, jest stwierdzenie, że współpraca gospodarstw w ramach szlaku „Małopolska Wieś Pachnąca Ziołami" może stanowić istotny bodziec w poprawie ich atrakcyjności i pozycji rynkowej oraz urozmaiceniu produktu turystycznego. Wyniki badań pozytywnie weryfikują postawioną tezę. Funkcjonowanie szlaku wpływa istotnie na pozycję rynkową gospodarstw członkowskich, poprawę jakości ich funkcjonowania oraz profesjonalizm. Artykuł powstał dzięki wykorzystaniu zwartych materiałów książkowych, czasopism, jak również informacji netograficznych i wywiadu z wybranymi agrogospodarzami i z dyrektorem organizacji odpowiedzialnej za powołanie szlaku. Metoda badawcza zastosowana w publikacji to analiza danych zastanych i wywiad z dyrektorem biura SOT oraz z wybranymi właścicielami gospodarstw członkowskich omawianego szlaku.

Słowa kluczowe: agrobiznes, agroturystyka, promocja, przedsiębiorczość, turystyka

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The minimum wage in Poland and its connection to unemployment: Evaluating causality

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Abstract: The paper's primary goal is the evaluation of the relationship between minimum wage, employment, and unemployment in Poland in the past two decades. It presents an overview of theoretical aspects of minimum wages, the main motivations behind its implementation, as well as potential negative consequences. The minimum wage in Poland is presented in comparison to other European Union countries. Finally, using a Toda-Yamamoto approach and quarterly data covering the years 2002–2019, the Granger causality between the Kaitz index and selected labour market indicators is examined. The results indicate the presence of unidirectional Granger causality between the Kaitz index and the general unemployment rate. It does not indicate similar relationships for other examined indicators, including employment rate and youth unemployment rate.

Keywords: labour market, causality, Granger causality, Toda-Yamamoto approach, minimum wage

1. Introduction

The first statutory minimum wage (abbr.: MW) dates back to 1894 New Zealand. After more than 120 years, minimum wages are present in the legislation of most countries in the world. In Poland, the subject of its economic effects gained much importance at the end of 2019, when the government declared a relatively rapid increase in the minimum wage for the following years (Cieślak-Wróblewska and Roguski, 2019). Furthermore, in 2020 the European Commission issued a proposal for a directive on adequate minimum wages in the EU, proceeded by two-phase consultations with social actors (European Commission, 2020).

Main concerns about MW involve its possible, negative impact on jobs and employment. Since it is a type of a price floor, in a competitive environment it creates excess supply, what corresponds to excess unemployment. In a standard ne-

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oclassical model, where workers receive value of their marginal product, rising the wages further leads to the layoffs (Stigler, 1946). However, conclusions from other labour market models, mainly monopsony model, are more ambiguous and sometimes may even suggest a positive employment effects (Holtemöller and Pohle, 2020). Rising MW reduces job creation and the demand for unskilled labour (Chu, Kou and Wang, 2021); however, at the same time it can reduce companies selectivity, encourage increased job search (Gavrel, Lebon and Rebière, 2010) or increase employees productivity (Ovens and Kagel, 2010). The employment effects of MW may also be reduced because of the adjustments, and dispersing wage increases costs over various channels (Schmitt, 2013).

The relationship of MW and employment is one of the most frequently discussed topics in economics (Schmitt, 2013). Research methods in this field have undergone massive changes in the past three decades. Time series methods have been often criticized, as many studies did not account for endogeneity, non-stationarity and dynamic specification (Williams and Mills, 2001). As Lee and Suardi (2011) point out, a number of different approaches has been proposed, including tests for structural breaks, applying an ARCH model (Park and Ratti, 1998), or vector autoregression (Williams and Mills, 2001); however micro-level data, panel data analysis and case studies became much more widespread. An overview and discussion on modern-day econometric approaches is provided by David Neumark (2018), as well as Belman and Wolfson (2014).

In this paper aggregated time series are applied, however not in order to estimate employment elasticities. The study verifies whether MW in Poland forms a causal relationship with employment and unemployment indicators. The paper is divided into 6 sections: (1) Introduction, (2) Theoretical perspective, (3) Minimum wage in Poland other EU countries, (4) Methods and data, (5) Results, (6) Conclusions.

2. Theoretical perspective

2.1. Definition and motivations behind minimum wages

The minimum wage may be defined as:

> The minimum sum payable to a worker for work performed or services rendered, within a given period, whether calculated on the basis of time or output, which may not be reduced either by individual or collective agreement, which is guaranteed by law and which may be fixed in such a way as to cover the minimum needs of the worker and his or her family, in the light of national economic and social conditions (ILO, 2014, p. 19).

This definition does not state who fixes the rate: while in most countries it is set by policy-makers, in some the system is based on collective agreements within industries. An important aspect of MW is its binding nature, as it is enforced by the state and cannot be lowered even when an employee agrees.

Quoted definition points to one of the fundamental premises for applying MW, which is a problem of in-work poverty. The ethical question of what constitutes a decent wage is much

older than MW. For Thomas Aquinas wages not meeting needs of a worker to support himself and his family (*status personae*) diminished their chance of a virtuous life and as so were unjust (Zając, 2005). Adam Smith pointed to the advantage that employers usually had over employees when setting wages. He argued that the employee's wage should always be sufficient to support oneself and, usually, also enable to start a family (Smith, 2007). However, as Werner and Lim suggest, it is uncertain whether Smith would favour solutions imposed by the state here (Werner and Lim, 2016). It is important to distinguish between concepts of MW and living wage, as the first one may be seen as a tool (effective, or not) to achieve the second. John Rawls, the author of *Theory of justice*, believed that the fairness of distributive shares depended on the allocation of wages and other income by background institutions, finding MW less effective than providing an adequate minimum in the form of transfers (Rawls, 2009).

Sometimes MW is seen as a tool to reduce income inequality and poverty, especially in-work poverty (Detragiache et al., 2020). Raising MW may impact general wage distribution, and because of spillover effects, it can affect more people than only those receiving it (Redmond, Doorley and McGuinness, 2020). Still, it is worth noticing that MW earners may be students or secondary earners in non-poor households, and not all poor households have members working at MW (Detragiache et al., 2020). Moreover, a rise in other wages, as a result of MW increase may amplify its negative effect on employment (Cahuc and Michel, 1996).

The role of the minimum wage in stimulating the productivity of enterprises is also suggested. Higher labour costs may induce companies to use more capital-intensive forms of production, implement organizational changes, or invest more in training (Riley and Bondibene, 2017). In addition, falling demand for low-skilled labour can encourage workers to build up human capital and increase the productivity of their work (Cahuc and Michel, 1996).

2.2. Employment effects

According to Belman and Wolfson (2014), there are three primary labour market models used in the MW research: (1) Competitive, (2) Monopsony and (3) Search Models.

In a simple neoclassical model of the labour market, wages and employment result from supply and demand in a fully competitive market (Vercherand, 2014). One's salary is the value of the marginal product contributed by one's labour (Card and Krueger, 1995). The establishment of a MW makes the work of people earning so far less than that no longer profitable. According to Stigler, an effective MW must therefore lead to the dismissal of the least productive workers or, less likely, improve their productivity (Stigler, 1946).

Such a model is based on several assumptions. First of all, the number of competing companies and relatively homogeneous employees must be so large that the decisions of individuals do not affect wages (Broniatowska, Majchrowska and Żółkiewski, 2013). Workers must have complete information about their wages and wages in other companies; they must also be ready to change jobs to better-paid jobs whenever possible. Labour is treated like any other mean of production (Card and Krueger, 1995).

In contrast, in the monopsony model, there is only one firm in the labour market, at least in the most literal sense. Often, when speaking of the labour market, monopsony is understood more broadly as any model with a positively sloping labour supply curve for an individual firm (Boal and Ransom, 1997). It may sometimes include search models as well. With sloping labour supply, the employer may pay employees below their marginal productivity and not lose existing workers right away (Manning, 2020). In the market with a monopsony advantage, companies operate with a shortage of employees as raising wages to encourage new employees would also involve raising the wages for currently employed (Card and Krueger, 1995). The employment effect of a modest minimum wage could be positive.

Search models point to the costs of job searching, especially information. Two key variables are (1) contact rate and (2) distribution of wage offers (Belman and Wolfson, 2014). The conclusions are highly dependent on individual model specification.

The other issue is that employers often disperse the costs of MW across multiple channels. John Schmitt (2013) points to 11 possible channels: reduction in hours, reductions in non-wage benefits, reduction in training, changes in employment composition, increasing prices, efficiency improvements, efficiency responses from workers, wage compression, reduction in profits, increases in demand and reduced turnover (Schmitt, 2013). Harasztosi and Linder (2019), examining the significant increase in the minimum wage in Hungary at the beginning of the twenty-first century, showed that 75% of the costs were paid by consumers and only 25% by the firm owners.

Most empirical studies around the world indicate a small, though negative, impact on employment (Jiménez Martínez and Jiménez Martínez, 2021). M. Martínez and M. Martínez (2021), authors of meta-analysis covering over 588 studies from the last 120 years, indicate also possible negative publication bias in developed countries. In high-income countries, most studies find employment effects too small to be observable in aggregate employment statistics (ILO, n.d.). A 2018 EU panel data study covering 18 countries found an elasticity of around –0.05 among the overall working-age population (European Comission, 2018).

In Poland, Małgorzata Fic (2010), using a model based on the neoclassical production function with a non-linear variable, estimated that in the years 1996–2007 the MW had a negative impact on employment when exceeding 41% of the mean wage. Majchrowska and Żółkiewski (2012), using panel data of NUTS2 regions in Poland, analyzed the period 1999–2010, concluding that the MW has a negative impact on employment in Poland, in particular with regard to young workers. Barbara Dańska-Borsiak (2014) used the Granger test to investigate the causality between the MW and the number of young working people. She found that in the years 1990 a 2013, both MW nominal levels and its ratio to the average wage (Kaitz index) were causes, in Granger sense, for the number of employed aged 15–29. According to the variant analysis from the study, the MW was optimal for youth employment at 40% of the average wage.

3. Minimum wage in Poland and other EU countries

The minimum wage has existed in Poland since 1956, although until 1990 its role in the wage system varied (Raczkowska, 2007). Since 2002, the national minimum wage system is legally based on the *Act of 10 October 2002 on the minimum remuneration for work* (Dz.U.

2002 No. 200, item 1679). Since 2017 an hourly rate has been introduced alongside the monthly rate. By the Law, the MW is agreed every year by the Social Dialogue Council, and the Prime Minister announces it by the 15th of September. If no agreement is reached, it is determined by the governmental decree. The change takes place following year, 1st of January.

In the European Union, there are statutory minimum wages in 21 out of 27 countries. In Austria, Denmark, Finland, Italy and Sweden minimum wages are set by collective agreements and vary from industry to industry. In Cyprus, there are statutory rates, although they are not uniform and differ for individual professions (Eurofund, 2021).

Figure 1. Minimum wages in the EU countries in January 2021 (PPS)

S o u r c e: Author's own elaboration based on Eurostat.

Figure 1 shows the minimum monthly wage in the EU countries in January 2021, expressed in purchasing power standard (PPS). The differences between the EU countries are considerable. In theory, the minimum wage allows a citizen of Luxembourg to buy more than 2.6 times more goods than a citizen of Bulgaria. In Poland the minimum wage expressed in PPS is 5% higher than the EU average.

Broniatowska et al. (2013) mention three criteria used to determine the MW in Europe: (1) workers needs, (2) comparable income, (3) percentage of the average wage. In Poland, under the current legislation, annual valorization should not be smaller than the forecasted consumer price index. Additionally, if the MW in a given year is lower than half of the average wage, it increases by two-thirds of the projected real GDP growth in the next year.

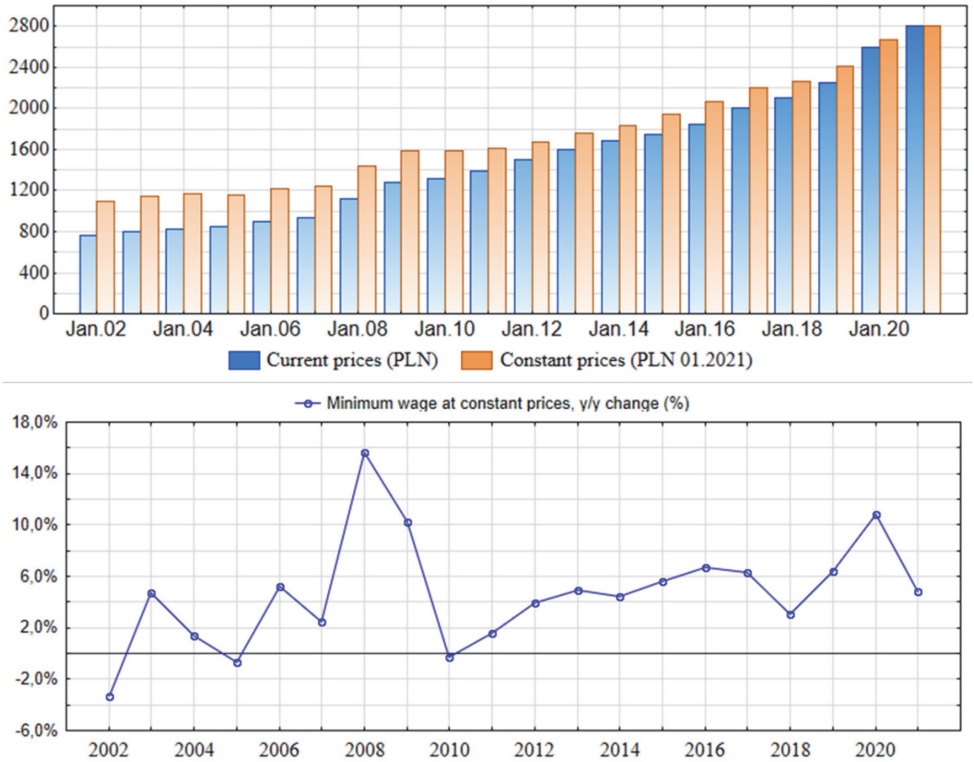

Figure 2. The minimum monthly gross salary in Poland in the years 2002–2021

S o u r c e: Author's own elaboration based on Eurostat.

Figure 2 shows the minimum monthly wage in Poland in 2002–2021 in the current prices and at constant prices (PLN, January 2021), as well as the dynamics of the constant prices MW. As it can be seen on the chart, only in 2002, before the current minimum wage act, the value of the minimum wage decreased significantly. That year nominal wage has not increased at all. After 2002, the dynamics of the real minimum wage varied significantly, but only in 2004, 2005 and 2010 it was around zero. The real value of the minimum wage in Poland grew every other year, the fastest in 2008, 2009 and 2020, when its year-on-year increase exceeded 10%. In 2021, the minimum wage in Poland was raised to 2,800 PLN.

In 2020, the European Commission presented a draft EU directive obliging the member states to introduce transparent and stable criteria for determining and updating the minimum wage. The directive leaves the determination and the decision to have a MW to the Member States, although the document states that a hypothetical increase in the MW to 60% of the median gross wage could improve its "adequacy" in half of the countries (European Commission, 2020).

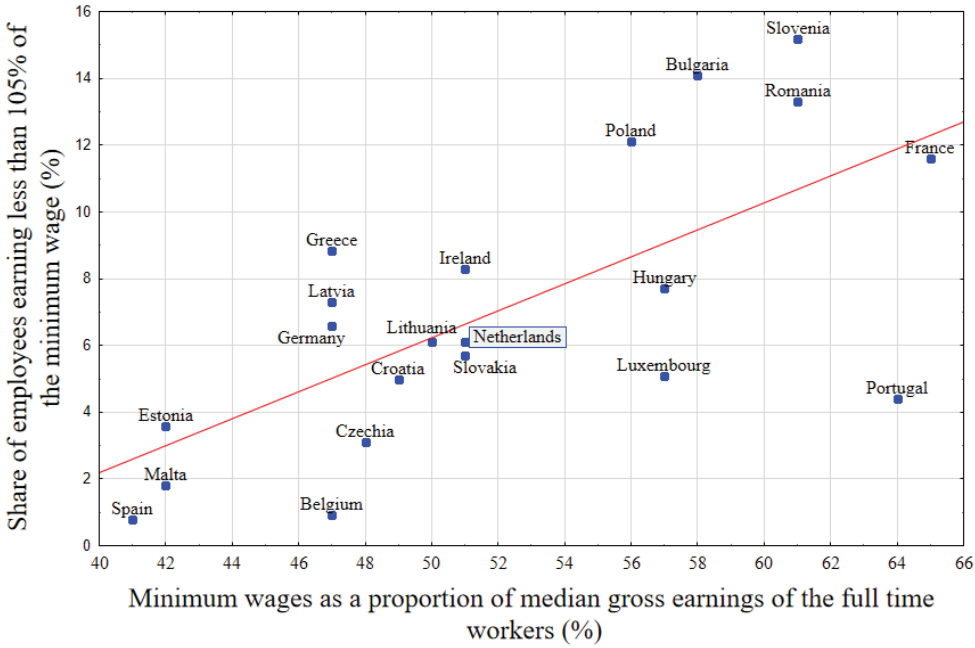

Figure 3. Ratio of the minimum wage to the median wage of the full time workers (%, x-axis) and share of employees earning less than 105% of the minimum wage in the EU countries (%, y-axis)

S o u r c e: Author's own elaboration based on Eurostat.

Figure 3 is a dispersion chart consisting of the ratio of the MW to the median wage of the full-time workers (x-axis) and the share of full-time workers earning less than 105% of the minimum wage (y-axis) in the EU countries in 2018. There is a visible correlation between those values, as countries with higher MW tend to have more people covered by them. The ratio of the MW to the median ranged from 41% in Spain to 65% in France. Only in four countries the minimum wage was higher than 60% of the median wage. In Poland, it was 56% in 2018, putting it at the eighth place in the EU. In five countries (Slovenia, Bulgaria, Romania, Poland and France) over 10% of full-time workers earned near the MW. In Poland, it was 12%, which put it in the fourth place in EU. In countries such as Malta, Belgium and Spain it was less than 2%.

It could be hypothesized that increasing MW may have sharper consequences in countries such as France, Slovenia or Poland than in Spain or Malta, although a comprehensive study encompassing all of these countries would be needed to confirm. It may also be worth examining, how their general institutional environment impacts MW effects on the economy. Within European countries, it is possible to classify groups with clusters of distinctive features that are significant to the labour markets (Mierzejewski and Chlebisz, 2019).

4. Methods and data

The study examines causal relationships, in the Granger sense, between minimum wage and selected labour market indicators in Poland between the years 2002 and 2019. The period considered does not cover 2020 because of significant external disruptions to the labour market, resulting from the pandemic, lockdowns and extensive governmental interventions.

The variable "x" is a Granger cause for "y" if and only if the future values of "y" can be better predicted using present and past "x" values. It does not necessarily mean any literal causation, yet, statistically, it gives evidence of constant conjunctions and suggests a relationship that is useful for predictions (Kirchgassner, Wolters and Hassler, 2013). As mentioned before, many studies from high-income countries imply that MW effects may be too small to be observable in aggregate statistics. The causality test may indicate whether one variable holds statistically significant information about future values of the other, in this case, whether Kaitz can be useful in predictions of employment and unemployment.

Instead of the standard Granger causality test, a modified approach, introduced by Toda and Yamamoto, is used. The Toda and Yamamoto procedure allows for causality testing even if the processes are integrated or cointegrated of an arbitrary order (Toda and Yamamoto, 1995).

The procedure consists of creating a VAR(k) model for both variables, where k is the maximum order of delay, and then estimating the VAR(k+d_{max}) model, where d_{max} is the maximum level of integration suspected in *x* and *y* processes. The estimated model can be written as:

$$y_{t=\alpha_{10}+\sum_{i=1}^{k+d}\beta_{1i}y_{t-i}+\sum_{i=1}^{k+d}\gamma_{1i}x_{t-i}+\epsilon_{1t}} \quad (1)$$

$$x_{t=\alpha_{20}+\sum_{i=1}^{k+d}\beta_{2i}x_{t-i}+\sum_{i=1}^{k+d}\gamma_{2i}y_{t-i}+\epsilon_{1t}} \quad (2)$$

In the next step, Wald's test is performed with imposed and zero restrictions on the initial parameters of VAR(k) model. Additional delays are not restricted (Czapla, 2009).

The null hypotheses are as follows:

$$H_0: \beta_{1i} = 0, i \leq k \text{—for the first equation}$$

$$H_0: \beta_{2i} = 0, i \leq k \text{—for the second equation}$$

Rejecting the null hypothesis means that there is Granger causality between the variables (Czapla, 2009).

A ratio of the nominal minimum wage to the median wage (Kaitz index) has been chosen as a measure of MW. Seasonality from this data series has been adjusted by Census II method, using Statistica software. Adjusting seasonality is necessary because of the natural labour market cycles. Even though the minimum wage in Poland changes the same month every year, adjustments should not cover its effects, as there is a significant variance between the changes. All the variables consist of 72 quarterly observations from the 2002Q1–2019Q4 period. The variables used in the study are:

- **MWR**—The ratio of the minimum wage to the average wage. Seasonally adjusted.
- **lnE**—Logarithm of the seasonally adjusted number of employees.
- **lnE15_24**—Logarithm of the seasonally adjusted number of youth employees (15–24 y.o.).
- **ER**—Employment rate. Seasonally adjusted.
- **ER15_24**—Youth (15–24 y.o.) employment rate. Seasonally adjusted.

– **UR**—Unemployment rate. Seasonally adjusted.
– **UR15_24**—Youth (15–24 y.o.) unemployment rate. Seasonally adjusted.

MWR dataset was created via own calculations, based on Statistics Poland (GUS) quarterly data on average wages, and ZUS data on minimum wage past values. Other variables were sourced from ILOSTAT Short-term labour force statistics (STLFS) database.

5. Results

To use the maximum integration degrees, it is necessary to perform unit root tests. Two tests were performed: the Augmented Dickey-Fuller Test (ADF) (Dickey and Fuller, 1979) and the KPSS test (Kwiatkowski and Phillips, 1992). In the former, the null hypothesis states the unit root presence (no stationarity). In the latter, the null hypothesis posits the process is stationary. The results of both tests and determined integration degrees are presented in Table 1.

With the *MWR*, *lnE15_24*, *ER15_24* and *UR*, both tests visibly indicate integration in the first degree, within a confidence level of 0.05. "*" marks the series for which the ADF and KPSS test results differed. For *ΔlnE* and *ΔER*, the p-value of the ADF test was less than 0.1, which means that at a slightly higher level of confidence the results would be consistent with KPSS. At *ΔUR15_24*, the p-value of the ADF test was 0.14, so the unit root hypothesis was not rejected, even though KPSS indicates that the series could be stationary.

Table 1. ADF and KPSS unit root tests

X	ADF: H0: the unit root is present		KPSS:	H0: the variable is stationary		Degree of integration of the variable, I (d)
Variable	t-Stat	p-value	KPSS	1%	10%	
MWR	–0.68508	0.8433	1.061713	0.739	0.347	I (1)
lnE	–1.05751	0.7281	0.951651	0.739	0.347	I (1) *
lnE15_24	–0.94448	0.7683	0.751522	0.739	0.347	I (1)
ER	–1.9852	0.2926	1.026479	0.739	0.347	I (1) *
ER15_24	0.288195	0.9761	0.825337	0.739	0.347	I (1)
UR	–1.9948	0.2885	0.907418	0.739	0.347	I (1)
UR15_24	–1.99474	0.2885	0.826139	0.739	0.347	I (2) *
ΔMWR	–9.03271	0	0.103459	0.739	0.347	X
ΔlnE	–2.80895	0.0623	0.128146	0.739	0.347	X
ΔlnE15_24	–8.08653	0	0.140757	0.739	0.347	X
ΔER	–2.83598	0.0586	0.089184	0.739	0.347	X
ΔER15_24	–7.89399	0	0.21667	0.739	0.347	X
ΔUR	–3.66869	0.0067	0.101186	0.739	0.347	X
ΔUR15_24	–2.39934	0.1457	0.103315	0.739	0.347	X

A d n o t a t i o n: "Δ" signifies the first differences.

S o u r c e: Author's own elaboration.

In the next step, the VAR(k) model was estimated using the levels (not the first differences). The optimal levels of lags were established based on information criteria, the autocorrelation of residuals and roots of the characteristic polynomial. The delays indicated by the information criteria are presented in Table 2. For the lnE variable, although most of the criteria indi-

cated a delay k=1, the delay k=4 (indicated by the AIC and FPE criteria) was chosen due to the model stability. The variable *ER15_24* was discarded from further analysis, as all information criteria point to lag 1, but the VAR model does not meet the stability criteria.

Table 2. Lag length selection

X	Delays indicated by the information criterion					X
Model	LR	FPE	AIC	S.C.	HQ	Decision
MWR/ lnE	1	4	4	1	1	4
MWR/ lnE15_24	1	1	1	1	1	1
MWR/ ER	4	4	4	1	4	4
MWR/ ER15_24	1	1	1	1	1	-
MWR/ UR	5	6	6	2	5	5
MWR/ UR15_24	4	4	4	2	2	4

S o u r c e: Author's own elaboration.

After estimating the VAR($k+d_{max}$) models with additional delays, a causality test was performed. The modified Wald test is consistent with the asymptotic Chi-square ($\chi 2$) distribution and the degrees of freedom equal to the number of lags ($k+d_{max}$). The null hypothesis is that there is no Granger causality between *x* and *y.* Test results are presented in Table 3.

Table 3. Toda-Yamamoto causality (modified WALD) test result

Null hypothesis	Chi-sq	Prob.	Granger causality
MWR does not granger cause LNE	6.207131	0.1842	No causality
LNE does not granger cause MWR	7.136222	0.1289	No causality
MWR does not granger cause UR	37.94636	0	Unidirectional Causality MWR→UR
UR does not granger cause MWR	6.008497	0.3054	No causality
MWR does not granger cause ER	4.926215	0.295	No causality
ER does not granger cause MWR	7.246875	0.1234	No causality
MWR does not granger cause LNE15_24	0.845128	0.3579	No causality
LNE15_24does not granger cause MWR	0.796914	0.372	No causality
MWR does not granger cause UR15_24	7,797165	0.0993	No causality
UR15_24 does not granger cause MWR	0.853252	0.9312	No causality

S o u r c e: Author's own elaboration.

The test rejected the hypothesis that the ratio of the minimum wage to the average wage is not a Granger cause for the unemployment rate (p-value=0). There is no basis to reject the hypothesis that there is no causality for the remaining variables. None of the analyzed variables is a Granger cause for the Kaitz index, while the Kaitz index is a Granger cause only for the unemployment rate.

6. Conclusions, limitations and further research

Over the last two decades, the real minimum wage in Poland has increased almost 2.5 times. The purchasing power of the Polish minimum wage in 2021 is slightly higher than the EU average. Poland is also among the countries with the highest minimum wage to median wage ratio and one of the countries with the highest share of people earning close to the minimum wage.

An effective minimum wage does not necessarily lead to a decline in employment. Most empirical studies point, however, to small, but negative effects. It should be remembered that the negative effects of the minimum wage may be distributed in a different way among individual social groups and some studies point to the harsher employment effects among people with low income.

The results obtained in the study indicate that in Poland, in the years 2002–2019 there was a causal relationship, in the Granger sense, between the Kaitz index and the unemployment rate. No such relationship was proven between the Kaitz index and the rest of the analyzed indicators.

Further, detailed studies are needed to estimate specific elasticities. Although it gives some solid ground for further analysis, the Granger causality approach is limited regarding the scope of conclusions drawn directly from it. It may also be desirable to apply a broader macroeconomic perspective to the minimum wage study. Relatively high economic growth might have been a contributing factor to the lower minimum wage employment effects, as well as recent lowering the retirement age, putting more people out of the labour force. The study ends in 2019, just before the Covid-19 pandemic. The global economic crisis, as well as extensive governmental interventions, will probably be a defining factor for the labour market in the coming years.

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Płaca minimalna w Polsce a bezrobocie i zatrudnienie. Ocena przyczynowości

Abstrakt: Celem artykułu jest ocena zależności między wynagrodzeniem minimalnym, zatrudnieniem i bezrobociem w Polsce. Przedstawiono przegląd teoretycznych aspektów płacy minimalnej, głównych motywacji za jej stosowaniem, a także potencjalnych negatywnych konsekwencji. Płaca minimalna w Polsce zostaje przedstawiona na tle innych krajów Unii Europejskiej. Wykorzystując metodę Toda-Yamamoto oraz dane kwartalne GUS i ILOSTAT obejmujące lata 2002–2019, zbadano przyczynowość Grangera między indeksem Kaitza a wybranymi wskaźnikami rynku pracy. Wyniki wskazują na istnienie jednokierunkowej przyczynowości Grangera między wskaźnikiem Kaitza a ogólną stopą bezrobocia. Nie wykryto podobnych zależności w przypadku pozostałych badanych wskaźników, w tym między innymi stopy zatrudnienia i stopy bezrobocia wśród osób młodych.

Słowa kluczowe: rynek pracy, przyczynowość, przyczynowość Grangera, Toda-Yamamoto, płaca minimalna

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Development of modern payment methods in Poland as an example of technological leapfrogging

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Abstract: In the Polish economy consumers can choose from various payment methods. Every method has its advantages and disadvantages. The literature on the subject includes numerous studies proving the higher cost-effectiveness of electronic payments, e.g. using payment cards. Poland is in the group of countries where people rather pay in cash than by payment cards. However, payment innovations are quickly adopted. In the second half of 2018 Poland was the first country in the world in which all payment terminals accepted contactless payments. This was possible thanks to top-down activities (e.g. Cash Support Program) but also thanks to the quick adaptation of these new payment methods by a large part of our society. This could be associated with a relatively shorter period of operation of non-cash payments, which made adaptation of the innovation easier than in other countries already using non-cash payments for some time. The concept of implementing the latest technologically advanced stage without the previous stages is called leapfrogging. The implementation and dynamic development of the latest payment technologies on the Polish market make use of the characteristic of this process, although it is not literal. Interestingly, after the implementation of modern payment methods the processes of further development of payment methods (BLIK system) began in our country, which gained the interest of the global payments giant (Mastercard). Therefore, we are not only adopting technology but also entering the group of technological leaders in the sphere of payments.

Keywords: leapfrogging, payment methods, contactless payments, mobile payments

1. Introduction

The article will first analyze the costs of individual types of payments, divided into cash and non-cash payments. The proven positive impact of non-cash payments on development confirms that promoting shopping using transfers, payment and credit cards as well as mobile payments is justified.

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Next, the concept of leapfrogging will be presented based on a literature review and on the example of the Polish payment market. Poland did not only even out the gap separating it from technology leaders. By quickly modernizing the payment infrastructure and Poles' openness to contactless payments, we managed to get into the group of leading countries using these technologies. What's more, thanks to the creative initiative, the BLIK payment system has been developed, which situates Poland among technological leaders of the payment system.

According to the research hypothesis, the development of the payment system in Poland has the character of leapfrogging combined with the endogenous innovative impulse.

The purpose of this work is to locate these processes in the theory of development and to indicate that in the case of the Polish payment system, the technology was not simply imitated. It absorbed and developed the system with internal resources. At the end of the work, conclusions were formulated regarding the further development of the national payment system.

2. Costs of payment habits

Money has a number of functions in the economy. It can store value (thesurization), value goods, but above all it serves exchange. Cash is still very popular in Poland, but then again, contactless and mobile payments are dynamically developing. A further increase in the share of non-cash payments may have a potentially beneficial effect on reducing the costs of operating payment systems. In Poland, the total private payment costs in 2015 were estimated at 31.2 billion PLN. The largest cost was generated by cash (21.1 billion PLN), but this is due to the largest share of cash in the number of transactions (11.8 billion cash transactions out of 17.0 billion of the total number of payments). Private costs for debit cards amounted to 6.1 billion PLN, while transfers generated 2.4 costs (NBP, 2019a, p. 8).

According to a survey conducted in 2009–2012 by the European Central Bank, the lowest social costs of operating the payment system were recorded in countries such as Denmark, Sweden and Finland (around 0.8% of GDP). Poland was among countries such as Bulgaria, the Czech Republic, Lithuania, Latvia, Romania, Slovakia and Hungary. For this group, the estimated social costs amounted to 1.01% of GDP (Schmiedel, Kostova and Ruttenberg, 2012; NBP, 2019a, p. 33). Countries with the lowest cost of servicing the payment system excel in cashless payment methods.

In 2015, the most expensive payment method per transaction was mobile payments (up to 94 PLN per transaction). However, this was due to the fact that at that time these systems were intensively developed and generated significant costs, while customers used this method to make even a smaller number of payments. Payments/ cash services were also relatively expensive (about 19 PLN). Direct debits (0.46 PLN) and transfer orders (0.48 PLN) were definitely less costly for banks. Payments by credit cards cost banks around 1.8 PLN (NBP, 2019a, pp. 57–58). However, taking into account the total amount of private costs of banks divided into payment instruments/ services, it should be noted that the largest costs are generated by cash of, which is about 9.5 billion PLN, and payment cards are cheaper (less than 2 billion PLN). The internal costs of cash-handling banks alone absorb 0.49% of GDP (NBP, 2019a, pp. 54–55).

In literature you can find a lot of research that shows that the spread of non-cash forms of payment is beneficial for the economy, because it is cheaper in servicing, therefore it does not generate such high costs. In addition to direct financial costs, cash payments take more time by deducting amounts and giving the change. According to the calculations of Humphrey et al. (2006), a country which switches from the cash-only payment system to an electronic system is able to save at least 1% of GDP. Gresvik and Øwre (2002) demonstrated how in Norway in 1988–2001, thanks to the spread of non-cash transactions, transaction costs of banks were reduced by 62%. Researchers have come to similar conclusions, e.g. in Spain (Carbo et al., 2002). Hasan et al. also showed a positive impact of the spread of electronic payments on economic development (2013). The research covered 27 EU member states in the period from 1995 to 2009. The increase in consumption and trade stimulated economic growth. In this context, the possibility of taking loans thanks to cards turned out to be beneficial, which resulted in consumption smoothing. Research on an even wider group of countries was conducted by Zandi et al. (2013). The research group included as many as 56 countries responsible for 93% of global GDP. The research period covered the years 2008–2012. The positive impact on GDP dynamics resulted from increased transaction efficiency and easier access to loans. In the years covered by the survey, the increase in the number of card payments generated an additional GDP growth of 0.3% in developed countries and 0.8% in developing countries. In another report of Moody led by Zandi et al. (2016), it was also found on the basis of surveys from 70 countries in the period 2011–2015 that the growing use of payment cards generated an additional 0.1% of the cumulative GDP growth in that period.

There are many factors that determine the type of payment. They may have a demographic character, i.e. refer to age, gender, income, etc. (Borzekowski and Kiser, 2008; Klee, 2008). The nature of the payment, the place where it is made (Bolt and Chakravorti, 2010) and the type of goods purchased (Von Kalckreuth et al., 2009) may be of great importance. Additional financial incentives and fees are also significant (Ching and Hayashi, 2010; Carbó-Valverde and Linares-Zegra, 2011). The role of payments in cash can have a cultural and social dimension. In countries such as Germany, Italy, Spain, Austria and Ireland the share of cash in transactions is relatively high. Alternatively, the Benelux and Nordic countries rarely use cash as a method of payment (De Meijer, 2010).

The share of cash payments, which is still high, may be due to the false belief that payments in cash are free. However, from the social point of view, the costs of money in cash are high because of the costs of: production, storage, distribution and protection. The grey economy can also be a social cost, which is more likely to exist due to cash (De Meijer, 2010). Currently in Poland, the society is quite dynamically and consistently increasing the share of non-cash payments. One of the factors of the development of non-cash payments was the constant reduction of "intercharge" fees (Oleńkiewicz, 2015).

Cashless turnover is one of the dimensions of the financial market development. There is a well-established link in the literature between indicators of financial development and economic growth (Beck et al., 2018).

3. Leapfrogging—a review of literature

In literature, the idea that poorer countries or regions are developing faster thanks to already developed technologies is known as convergence (Barro et al., 1991; Barro and Sala-i-Martin, 1997). Brezis, Krugman and Tsiddon (1993) noted that technological progress does not always have to strengthen technologically advanced nations, as assumed by the theory of endogenous growth. In the case of technological changes, leading nations have extensive experience and are strongly rooted in previous generation technologies. Poor countries with low labor costs can then adopt the latest solutions bypassing previous stages. Thus, they can gain a relatively better competitive position. This scheme is called leapfrogging. Leapfrogging, e.g. in the field of technology, consists in adopting a recently developed technology without using its previous versions (Davison et al., 2000). However, other authors indicate that leapfrogging may also refer to such areas as politics or organizational structures (Perkins, 2003; Steinmueller, 2001).

Many researchers consider leapfrogging to be possible and necessary. Global institutions supporting the development of emerging markets are of the opinion that thanks to the digital revolution, leapfrogging, i.e. "skipping" particular stages of development and determining new growth paths", has become not only possible but necessary (World Bank Group and China Development Bank, 2017, p. 11). Then again, one can also notice skepticism towards the concept of leapfrogging, indicating that technological changes are more of a gradual than "skipping" character (Ho, 2005; Rock et al., 2009). Hobday (1994) while conducting researching within the electronics industry in Singapore questioned the idea of leapfrogging, emphasizing the role of gradual accumulation of technology.

International institutions such as World Bank or China Development Bank are keenly interested in implementing this type of development strategy in Africa. According to the report (World Bank Group and China Development Bank, 2017), the potential lies in the following areas of the economy: (a) agriculture, (b) education, (c) energy, (d) finance, (e) governance, and (f) information as well as in communications technologies.

The concept of leapfrogging can also be applied in the context of the adoption by the developing countries of technologies that are environment-friendly. It is about skipping the development path followed by developed countries, which largely contributed to the degradation of the natural environment (Schroeder and Anantharaman, 2016). The idea of using leapfrogging to protect the environment is not a new idea. This topic was discussed, among others, by Perkins (2003) or Sauter and Watson (2008). Work on these type of issues is carried out all over the world, e.g. China (Binz et al., 2012) or generally in the "Global South" (Evans, Browne and Gortemaker, 2018).

Leapfrogging can also be analyzed in the context of the consumer market. An ecological solution in the field of automotive can be applied bypassing the previous stages (Moon et al., 2021), as well as the Energy Internet (Akhil and Patil, 2021).

Schroeder and Anantharaman (2016) indicate that, in literature, much attention has been paid to technological solutions in the context of leapfrogging, while "soft" factors such as lifestyle, consumption patterns and consumer behavior in general were neglected.

In the financial sphere, leapfroginng has great potential. Thanks to telephones and the Internet, a rapid increase in the availability of financial services for the population has become

possible, e.g. in African countries (World Bank Group and China Development Bank, 2017, p. 35). The phenomenon of leapfrogging in finance, consisting in the amplication of mobile payments bypassing the previous stages (traditional banking and internet banking), was empirically demonstrated by Gevaudan and Lederman (2020). For example, in Kenya in 2007 financial services provided via a mobile phone enabled consumers to operate their accounts, pay bills, etc. by the use of a smartphone. Thanks to this, a technological leap was made (World Bank Group and China Development Bank, 2017, p. 36). The lack of financial services has been replaced by widespread and cheap access to them due to the use of existing technical infrastructure, in this case mobile phone networks. The development of services was dynamic, which resulted in new services (e.g. withdrawals from ATMs, the possibility of buying mobile tickets for events, company accounts, etc.).

In Kenya the proportion of financially excluded people fell by 25 percentage points over 10 years (2006–2016) (Ndung'u, Morales and Ndirangu, 2016). The improvement of the situation resulted in the reduction of transaction costs and faster economic growth. Most importantly, a better allocation of resources directed funds to people who had entrepreneurial potential that was hampered by the lack of funds (Dabla-Norris, Ji and Townsend, 2015). The example of Kenya is not the only one. Significant progress can also be noted in Tanzania and Uganda (Ndung'u, Morales and Ndirangu, 2016). In 2016, as much as 89% of the population in Rwanda had access of some kind to financial services due to the development of digitized financial services and government support (Rwanda FinScope, 2016).

It is a paradox that some developed economies, e.g. the USA, are lagging behind when it comes to adopting payments by telephone (Han and Wang, 2021).

Most importantly, the rapid improvement in technology can take place not only due to market factors, but also through infrastructure modernization policy that will allow entering a new technological level. Leapfrogging initiated by infrastructure development has taken place in many countries with economic success (e.g. South Korea, Taiwan and Singapore) (Mody and Sherman, 1990).

In the context of leapfrogging technology, there can be numerous barriers (Watson and Sauter, 2008): "absorptive capacity, technological capabilities, knowledge, institutions, the accumulative nature of knowledge, and the international technology market". Absorption capacity is the biggest barrier when it comes to the development of developing countries (World Bank, 2008). On the enterprise level, the possibility of absorption can be defined as the ability to recognize the value of new information and use it in the production of commercial goods (Cohen and Levinthal, 1990). The nation's technology absorption capacity depends on technological capabilities, knowledge and institutions. Lack of appropriate knowledge can even lead to regression and a return to technologies of previous generations (Gallagher, 2006). It is important to build knowledge within the organization but also to have access to other knowledge, outside the organization (Lewis, 2007). Another factor are institutions, which can be defined as a set of procedures, laws, principles or habits that determine the interaction between individuals and groups (Edquist, 1997, p. 46). In this context, it is worth bearing in mind the cultural factors that determine the form of the institution. For example, the barrier may be the risk-averse culture, where failure is considered unacceptable, therefore it can be an obstacle when it comes to technology absorption (Gray and Sanzogni, 2004). The accumulative nature of building tech-

nology absorption possibilities is somehow contrary to the idea of leapfrogging. However, the ability to build and maintain technological knowledge often depends on earlier stages of development of these technologies (Hausmann and Klinger, 2007). Given the international technology market, there may be some barriers to leapfrogging, e.g. when only a few companies dominate technologically (Watson and Sauter, 2008). Another barrier in this context may be the reluctance of global companies to transfer clean technologies to developing countries, beyond the state imposed by their legal regulations (Gallagher, 2006). Global technology leaders are naturally interested in maintaining their advantage by outlays for research and development or limiting technology transfer at its advanced stages. However, it is not always easy to protect yourself against the spread of technology. Finished products are the technology carriers. Thus, some customers can use reverse engineering to learn about imported technology and use it to produce modified and even improved versions of products. An example of such activities are Korean companies (Lee and Lim, 2001).

4. Leapfrogging on the example of the Polish contactless payment market

Analyzing the absorption of new technologies in banking in Poland, one can come to the conclusion that there has been a kind of a leapfrogging phenomenon. The share of payment cards in a classic form (read in the terminal) or the number of bank accounts stood out from the EU average, while in terms of contactless payments, we are the leader. This topic will be expanded further in the article.

Considering the number of bank accounts per person in the years 2001–2017, it should be noted that at the beginning of this period, the EU average value was then 1.2 bank accounts per person. At that time in Poland it was only 0.4, three times less. In 2014, Poland managed to catch up and exceed the EU average. In 2017, there were as many as 1.9 bank accounts per person in Poland, while the EU average was 1.7 (NBP, 2018, p. 8). Analyzing the indicator of devices accepting electronic payment instruments (POS terminals and imprinters) per 1 million inhabitants, it should be noted that the number of these devices in Poland has been systematically increasing but the EU average remains out of reach. In Poland, in 2017 there were 16,252 such devices per 1 million inhabitants, while the EU average was 26,436 (NBP, 2018, p. 14). Therefore, when it comes to infrastructure for non-cash payments, Poland is still in some sense a chasing country. Alternatively, when analyzing the number of non-cash transactions made with payment cards per person, the situation looks better for Poles. In 2001, an average of 2.3 card transactions per year were made in Poland, while for the EU average this value was 37.3. In 2017, the EU average was still higher (135), but the gap was almost evened out (100.6). In Poland this proces was very dynamic (NBP, 2018, p. 19). Taking into account another indicator: the number of transactions carried out with a single payment card, an interesting phenomenon can be noted. At first, Poland was left behind, but in 2015 Poland was ahead of the EU average in this respect, increasing its advantage over the years. In 2017, an average of 95.2 transactions were made in Poland with one card, while in the EU average it was 70.1. Similar relationships can be observed taking into account the number of non-cash transactions at individual POS terminals (NBP, 2018, p. 22). This shows that despite the pay-

ment infrastructure not being very well developed, Poland is catching up with the number of transactions by the intensive use of terminals and cards.

The issue of payment infrastructure looks different if we look at it from the point of view not of quality but quantity. In the second half of 2018, Poland became the first country in the world in which 100% of POS terminals installed accepted contactless payments (NBP, 2019b, p. 7). This fact shows that Poland is a global leader when it comes to contactless payments. Changes and development of the payment network is taking place not only thanks to Poles' openness to new, more innovative payment methods, but also thanks to institutional support. As part of the Non-Cash Turnover Support Program, retail and service outlets can count on annual funding for the costs of installing and using payment terminals. The program applies to facilities/ services where payments by the use of a terminal were not possible (NBP, 2019b, p. 7).

Taking into account the share of contactless payments in the total number of transactions in POS (point of sale), the leaders are the Czech Republic (93%), Georgia (89%) and Poland (83%). We are ahead of countries such as Spain (57%), Austria (50%), the UK (46%), France (25%), Germany (14%) or Belgium (4%). Paradoxically, established payment habits with traditional cards can be an obstacle for countries with a long tradition of non-cash payments when switching to newer technology.

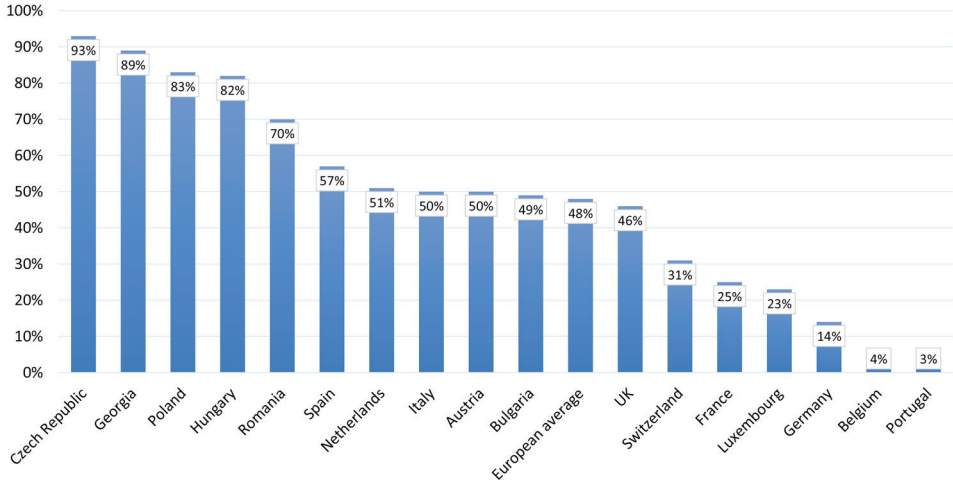

Figure 1. Share of contactless payments in total payments made at POS

S o u r c e: statista.com.

5. Development of mobile payments

The BLIK system is an innovation in the field of mobile payments. It was created by Polski Standard Płatności sp. z o.o (eng. Polish Payment Standard, limited liability company). It allows for online payments and payments in traditional stores, offices or public transport. What's more, BLIK also allows to send money between users (P2P). Thanks to this, it is possible to immediately send funds to another person, based only on their phone number. To use

BLIK all you have to do is connect your phone number and bank account number using the application (NBP, 2019b, pp. 46–47).

The BLIK system is very convenient for online transactions. Unlike payment cards, you do not need to provide card details. When paying with BLIK, transactions are authorized by entering the code from a mobile phone or tablet. A given store or browser of a trusted device can be remembered, thanks to which it is possible to authorize payments just by one touch, even without entering the code. Thanks to this, the payment requires almost no effort and minimizes procedures to a minimum, while maintaining high transaction security.

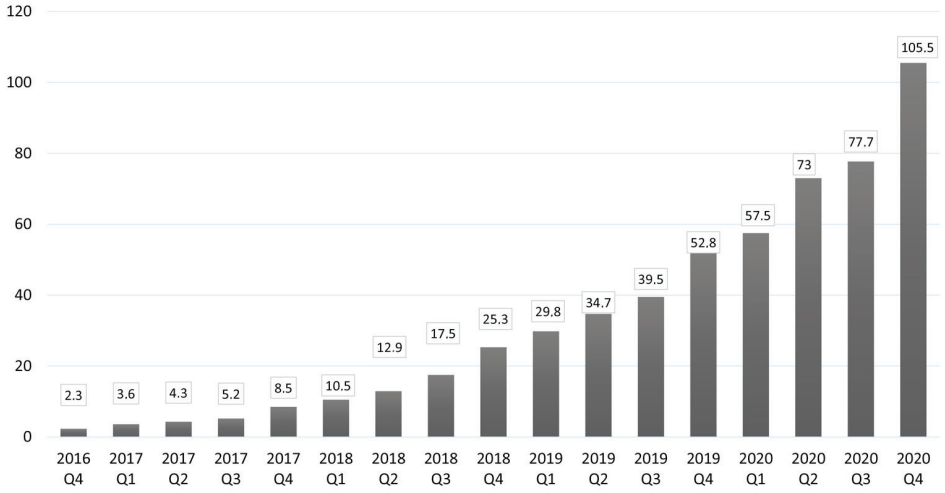

Figure 2. The increase in the number of online transactions using the BLIK R/R system, data in millions

S o u r c e: Polish Payment Standard.

Figure 2 presents a dynamic increase in the number of online transactions paid with BLIK. In the fourth quarter of 2016, 2.3 million transactions were made with BLIK, but four years after it was almost 46 times more (105,5 milion). Therefore, one can observe a systematic increase in the number of payments using the modern Polish Payment System.

The BLIK system is not the only payment method via smartphone. There are also Google Pay and Apple Pay technologies. As part of the service, you can store data about payment cards and their use in the payment process on your phone. Card data are encrypted, each card is tokenized and receives a VAN (Virtual Account Number). Thanks to this, the card details are not known to third parties, e.g. stores. Google does not authorize or process transactions. Thanks to this wallet you can pay by phone, which is equipped with the NFC module and Android. The application works in the background, so payment is possible at any time. Just unlock the phone and bring it closer to the terminal. Payments up to 100 PLN do not require authorization, as in the case of contactless cards. A similar payment method is also offered by the iOS operating system, which is the Apple operating system (NBP, 2019b, p. 103).

6. Conclusion

The phenomenon of leapfrogging is characterized in the article. It involves the adaptation of technology at an advanced stage, bypassing the previous stages. The development of individual payment methods in Poland has some characteristics of this phenomenon, although it is not in a literal sense. Individual payment methods, for example transfers or cards have been adapted in Poland, but the newest methods such as contactless payments or mobile payments have been adapted extremely quickly, thanks to which we have outrun the technological leaders in this respect. The diagram of this process is illustrated in Figure 3.

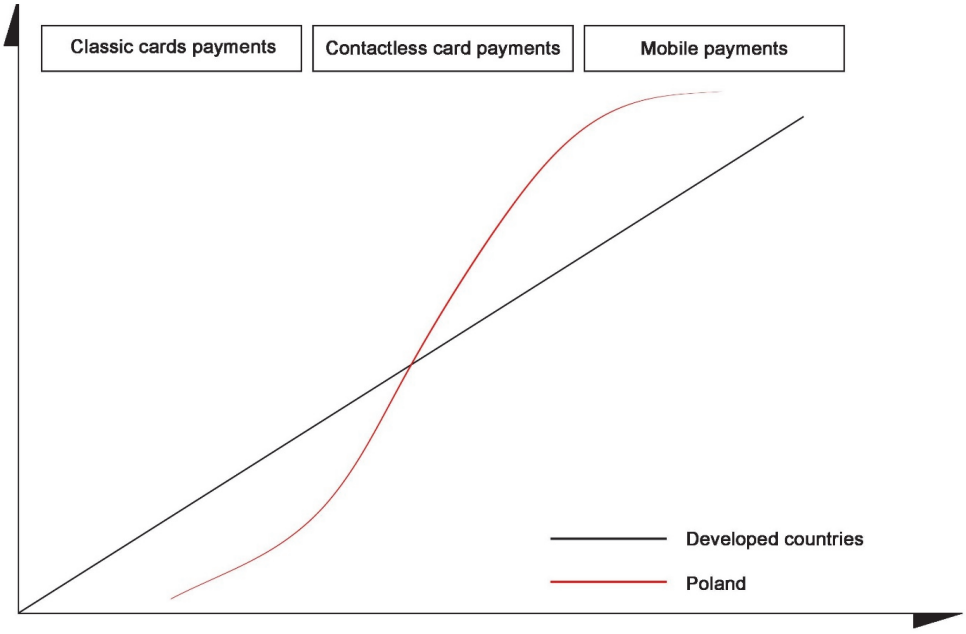

Figure 3. Schematic approach of the relationship between the state of payment technologies in Poland and in developed countries

S o u r c e: Author's own elaboration.

Bearing in mind the presented phenomenon, the hypothesis according to which the development of the payment system in Poland has the character of leapfrogging combined with the endogenous innovative impulse has been positively verified.

The widespread acceptance of contactless and mobile payments by the Polish society means that Poland currently has one of the most modern payment systems in the world, which does not change the fact that a large part of Polish society, for example the elderly, still use cash as the main payment method. The growing acceptance for non-cash payment methods may contribute to an increase in the GDP growth rate in Poland, and a decrease in the social costs of operating the payment system.

According to the opinion expressed in the report of the National Bank of Poland (NBP, 2019a), Poles should have access to various payment methods, thanks to which it is possible to properly use the advantages of all of them. You can promote cashless trading, which, with a sufficiently large share of the transaction, is cheaper and more efficient, but cash should not be banned. Arguments for maintaining cash include, among others, its resistance to lack of electricity supply or infrastructure enabling non-cash payments. What's more, some people only pay in cash and changing the payment method could be associated with stress and a high degree of uncertainty. Among this group, the largest share is elderly people. The grey market is one of the reasons against cash. Cash payments remain largely excluded from state control, which is why it is understandable to impose restrictions in this respect for entrepreneurs and for very large cash payments of individuals. However, daily cash payments should be enabled. Too radical moves in this field may lead to the turn to a poorly regulated or unregulated market of cryptocurrencies and other online payments, and ultimately to full-bodied money (gold or silver), or more broadly: to commodity money.

As part of a healthy diversification of payment methods, there is also a need to take advantage of the technological momentum and opportunity faced by the BLIK payment system. Further development is possible, and further increasing the volume of transactions in the system is a step towards easier payments for the benefit of economic growth. Looking ahead, the development of the stablecoin market should be monitored. Stablecoins are crypto-assets with a stable value in relation to mainly fiat currencies (Ante et al., 2020). Experiments with these types of projects are carried out by various central banks, working on the so-called CBDC (central bank digital currency) (EBC, 2020). It will probably be an opportunity to support the endogenous technological momentum within the Polish payment environment and maintain achievements of the BLIK system in placing Poland among the leaders of payment innovations in the world.

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Rozwój nowoczesnych metod płatności w Polsce przykładem przeskoku technologicznego

Abstrakt: W polskiej gospodarce konsumenci mogą wybierać spośród różnych metod płatności. Każda na swoje wady i zalety. W literaturze przedmiotu można znaleźć liczne badania dowodzące wyższej efektywności kosztowej płatności elektronicznych, na przykład za pomocą kart płatniczych. Polska znajduje się w grupie krajów, gdzie przywiązanie do gotówki jest względnie duże. Równocześnie innowacje płatnicze są szybko adaptowane. Polska w drugiej połowie 2018 roku była pierwszym krajem na świecie, w którym wszystkie terminale płatnicze akceptowały płatności zbliżeniowe. Było to możliwe dzięki działaniom odgórnym (np. Programu Wsparcia Obrotu Bezgotówkowego), ale również dzięki szybkiemu przyswojeniu tychże nowych metod płatności przez dużą część naszego społeczeństwa. Mogło się to wiązać z relatywnie krótszym okresem funkcjonowania płatności bezgotówkowych, przez co adaptacja innowacji była łatwiejsza niż w krajach dojrzałych. Koncepcja implementowania najnowszego technologicznie etapu z pominięciem stadiów wcześniejszych nosi nazwę leapfroggingu. Implementacja i dynamiczny rozwój najnowszych technologii płatniczych na polskim rynku noszą znamiona tego procesu, choć nie są nim w znaczeniu dosłownym. Co interesujące, po wdrożeniu nowoczesnych metod płatniczych w naszym kraju rozpoczęły się procesy dalszego rozwijania metod płatności (system BLIK), który zyskał zainteresowanie światowego giganta płatniczego (Mastercard). Mamy zatem do czynienia nie tylko z zaadoptowaniem technologii, ale i z wkroczeniem do grona technologicznych liderów w sferze płatności.

Słowa kluczowe: leapfrogging, metody płatności, płatności bezdotykowe, płatności zbliżeniowe

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Economy and spatial order. Planning and the policy of regional and local development

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Abstract: The article presents both theoretical and practical aspects of socio-economic activity in the country, regions and municipalities. Attention is paid to the formulation of the theory of location and spatial order in spatial economy, contained in the main paradigms of J. H. von Thünen, A. Weber, H. Hotelling, W. Christaller and A. Lösch, as well as in the more recent (contemporary) theories of W. Isard, R. Sinclair, and C. Ronsard. In the next part of the study, theories of spatial development—regional and local—are outlined. On this basis, the article presents new aspects of planning, order and spatial policy in Poland, taking into account the national, regional (voivodeship) and local (municipalities and poviats) levels. In the above-discussed topic, compatible issues preceding planning were taken into account, i.e. preparation of a development strategy, and then the assumptions and practical implementation of regional and local development policy.

Keywords: conventional and spatial economy, location, spatial order, planning, theory of regional and local development, spatial policy

1. Introduction

Various scientific studies show that the polarization of the Polish economic space continued throughout the post-war period, and in a special way after 1989. This is evidenced, inter alia, by the marginalization of some post-industrial and former state farm areas. Only some regions were able to use their own resources, human and intellectual capital in the period of systemic transformation in order to undertake actions activating the regions and local socio-economic development and to improve the level of competitiveness. In the economic space of the country, an important role in solving these and other issues is played by the use of scientific knowledge in the field of economic and social space, spatial order and balance in the market economy, and more fully—theoretical knowledge formulated by conventional and spatial economics and theories of location.

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Planning and spatial policy at various territorial levels of management are a pragmatic reflection of these activities and solutions.

The aim of this study is to present both theoretical and practical aspects of the activities of economic entities, institutions and people in the economic and social space.

The article highlights the significant role of spatial economy in formulating the notions of order and balance, and the theory of location, in the main paradigms of: J. H. von Thünen, A. Weber, H. Hotelling, W. Christaller and A. Lösch.

The next part of the article outlines the theories of spatial development—regional and local, and then new aspects of spatial planning and order in Poland. Planning and spatial policy (regional and local) are presented at the EU and national, provincial and local (municipality) levels.

2. Socio-economic space and spatial order in the economy

Space is treated as an ambiguous concept, the most important in functional analysis. It has been constantly evolved and developed in science as a mathematical, probabilistic, physical space, e.g. space-time in Einstein's theory of relativity, geographic and geodetic space.

The concept of socio-economic space covers a variety of human activities in the economy and society (Domański, 2006) in a specific area and has strict connotations with geographic and geodetic space. Thus, it concerns the area where spatial management takes place. The distribution of economic activity in space (regions) can be considered in the following systems: point (enterprise), line (communication network), surface (agricultural crops) and others, also taking into account the time dimension.

It can be assumed that if there is a specific territorial organization in a given socio-economic space, then the spatial order includes the distribution of individual elements in space and mutual interactions with the natural environment (Becla and Czaja, 2004). Spatial order understood in this way takes into account economic (growth and development), functional (structural) and environmental (natural balance) goals.

The state of the spatial regional structure of the country will be a synthetic expression of the spatial order. Thus—following R. Domański—the theory of spatial management, based on the above-mentioned premises, is an economic theory enriched with the spatial dimension of the economy, taking into account the spatial order (Domański, 2006).

According to T. Borys, spatial order is an integral part of the concept of sustainable development, understood as an order integrated with the social, economic and environmental order. The author believes that spatial policy should be an expression of spatial order planning. In the concept of this policy: this order expresses the achievement of harmony, balancing and ordering the entire human environment. The introduction and provision of spatial order takes place through space management, i.e. within planning and executive decisions in the processes of shaping, managing and protecting space (Borys, 2004).

Spatial solutions ensuring order (from the legal point of view, also as a constitutional order) require, inter alia, the principles of rationality and optimality of economic choice, as well as the requirements of balanced and sustainable development (eco-development), to be taken into account in planning activities. A properly organized decision-making process allows for the implementation of the institutional order in the economy (Lechwar, 2006).

The spatial order, from the economic point of view, is to ensure proper (optimal) location solutions in the decision-making processes of the urbanization of the distribution of industry, infrastructure, communication network and tourist facilities, the regionalization of agricultural production, as well as economic units in relation to the markets. Moreover, it facilitates the making of important location decisions, e.g. investment decisions. This is broadly reflected in the formulated theories of the location of spatial economics.

3. Space and location in the theory of conventional and spatial economics

Conventional economics did not take space into account in theoretical considerations. Yet A. Smith noticed spatial regularities related to area and distance. However, mainstream economics from the early nineteenth to the mid-twentieth century was limited to the study of an economy devoid of spatial dimensions (Blaug, 1994). And yet, from the earliest times, natural space has been a source for people to obtain goods to meet their needs through the exploitation of resources. Aristotle (*Politics*) and Xenophon (*Economics*) were already interested in managing land separated in space. The earth played an important role in the mind of medieval philosophers as well. And later the physiocrat F. Quesnay appreciated it even more as a source of wealth for the state and its citizens. In 1766 A. Turgot first described the operation of the law of diminishing returns from land, and then A. Smith indicated the importance of land as a source of land rent. Later, the concept of income from land was developed by D. Ricardo.

Spatial economy was established and began to develop in a trend independent of classical and neoclassical economics, starting from the nineteenth century. Its precursor was R. Cantillon, who, as a late mercantilist and an early physiocrat, first drew attention to the factors creating economic and social space and its importance in the economy (*Essai sur la Nature du Commerce en Général*, 1755). J. H. von Thünen (*Der Isolierte Staat*, 1826) is considered to be the actual founder and father of spatial economics and the theory of location. His theory was later developed by W. Launhardt (*Mathematische Begriin Lung der Volks-wirfschaftslehne*, 1885). On the basis of Thünen's theory, the latter was the first to propose a theory of the location of an industrial plant. A quarter of a century later, A. Weber developed his own, innovative theory in the historical and evolutionary approach (*Über den Standort der Industrien*, 1909).

In turn, the determination of the optimal spatial location of an industrial plant was made by H. Hotelling (1920), W. Christaller (1933) and A. Lösch (*Die räumliche Ordnung der Wirtschaft*, Jena, 1940).

After the period of visible domination of the German school, the development of economic spatial analysis after World War II is increasingly attributed to English (W. Isard) and Italian (J. Pinto) researchers, and especially the American-French tradition of economic engineers (R. Dean et al., *Spatial Economics Theory*, 1970; C. Ronsard, *Analyse Economique Spatiale*, 1988). However, earlier, in 1942, L. Hoover published a work translated and published in Poland in 1962, entitled *Lokalizacja działalności gospodarczej* [Location of the business]. C. Ponsard pointed to four paradigms of spatial economy, historically shaped by their authors and continuators in the following chronological order (Ponsard, 1983).

J. H. von Thünen's paradigm

In spatial analysis J. H. von Thünen drew attention to the market and the location of crops in relation to it and the methods of their implementation. In his concept, he relied on the classical theory of land rent, the function of distance and transport costs, adopting certain simplifying assumptions. On this basis, he formulated the law: *Agricultural production intensity is a decreasing function of the distance between farms and the market (city), because transport costs increase with the distance from it*.

Based on this theorem, J. H. von Thünen formulated the next law important for the theory of the location of agricultural production: *The intensity of agriculture decreases continuously in successive rings as it moves away from the centre (market)*. In the first ring there is intensive agriculture with horticulture and milk production, in the second—forest management and recreational functions, in the third—extensive agriculture, and in the fourth—other animal production.

J. H. von Thünen's theory of rings was considered pioneering in spatial economics, but it has many simplifications. His model adopted for the conditions of free competition turns out to be of little use in the conditions of a monopolized economy. In addition, it is believed that it has lost its application significance, as nowadays there is an extension of the range of markets for individual products, a reduction in the seasonality of production, an increase in the scale of production, urban development and the use of state interventionist instruments.

W. Launhardt, economist and engineer, adopting the values of J. H. von Thünen's theory, gave it mathematical content contained in the first textbook of mathematical economics published as early as 1885. His theoretical concept of the location of economic activity included an analysis of the significance of market regions when he had in mind the location of industrial plants. In his investigations, he searched for optimal geometric solutions, in the so-called three points (three weights).

A. Weber's paradigm

This presents the theory of the location of industry in the development conditions of a market economy based on new production and transport techniques. The main goal for the author is to determine the point of the minimum cost of transport, referring to Launhardt and Pick. In a mathematical supplement, Weber's books indicated the optimal solution by the method of three rings in a location triangle, in the so-called pole point. In this way, they opened the way to the use of a new graphic approach—contour lines, i.e. equal total increments of displacement and calculation of transport costs in alternative locations.

Weber's theory contains a valuable concept of location factors, distinguishing between the elementary factor (transport costs) and the secondary factors in the conditions of the monopolistic structure of the market economy. It ignores all considerations about the sales markets and supply areas. Such considerations were undertaken 30 years later by T. Polander, combining the theory of the location of the plant with the analysis of the market area (*Beiträge zur Standortstheorie*, 1935). In this way, as stated by M. Blaug (Blaug, 1994), he finally dealt with the location of the enterprise in space.

The theoretical approach to Weber's location partially lost its importance along with the decrease in the share of transport costs in total costs. Then again, technical progress in transport increases the importance of areas further away from the markets.

H. Hotelling's paradigm

This pattern of theoretical description aims to find the optimal location under certain conditions, e.g. at completely inelastic demand (*Stability in Competition*, 1929).

Searching for the correlation between the prices of a homogeneous product, the size of the market and its location in a dual approach, the author shows that the optimal locations of the two sellers will meet in the centre of the market (the so-called Hotelling's law). In his opinion, the concentration of locations may be an equilibrium situation under certain conditions and is consistent with the question of the optimality of such locations.

Hotelling's law treats the market as rectilinear, although it is controversial and inspired research to confirm or reject the law of concentration in the centre. There is also a contemporary tendency to integrate the Hotelling paradigm with models of spatial interactions. Criticism of this theory focuses primarily on its use of too many simplifying assumptions.

The paradigm of W. Christaller and A. Lösch

This includes the famous theory of core centres, re-formulated in the years 1933–1939, and its subject matter is the construction of the "economic landscape". W. Christaller searched for answers to questions about the size, number and geographical distribution of cities on the basis of economic theory. He assumed that the distribution of cities was not arbitrary, as they constituted a regular, hexagonal geometric structure.

Lösch, alternatively, constructed hexagonal networks, market surfaces for every good, tying them into network systems that allowed the determination of economic regions. The theory of regions includes a description of models of the interdependence of the location of homogeneous production spaces and the exchange of goods, or of various groups. In this way, W. Christaller and A. Lösch take full account of the macroeconomic dimension of the location of markets and production in economic regions (theory of regional structures).

The authors of the paradigm in question reach the following conclusion: as a result of the impact of economic factors, space is differentiated through the process of concentration of markets and production, influencing their location and competitiveness. The critique of the paradigm focuses mainly on the inadequacy of the search for the state of equilibrium, presenting this state as unrealistic. The contemporary continuation of this research relates to the application of mathematical programming in the description and evolution of an urban network in the process of urbanization.

4. Contemporary theoretical view of economic space and location

Contemporary studies generally also refer to the theory of core centres, although their considerable dispersion is currently observed. In 1925, O. Jonasson made another attempt to adapt the J. H. von Thünen model to the current conditions and needs. In terms of the location of agricultural production, this author distinguished the following rings around the city:

first—horticulture, second—intensive agriculture with milk production, third—extensive cultivation of plants, fourth—extensive farming and forestry.

In 1956 W. Isard tried to eliminate the dichotomy between mainstream economics and spatial economy by creating his own location model (Isard, 1956). This author uses linear production functions so that the optimal location of the plant is still at the point of minimum transport costs. It should be noted, however, that this problem becomes more complex with the substitution of factors of production and a change in the level of production.

R. Sinclair (Sinclair, 1967) also refers to the J. H. von Thünen paradigm, noting contemporary environmental threats. That is why he put forward a different, controversial, thesis about the reverse of the production rings and the distribution of cities. Taking into account the expansion of cities and ecological issues, he assumes that the quality of agricultural production and its productivity grow remotely from the city (market). Its rings include: first—urban agriculture; second—land used temporarily for livestock (meadows and pastures); third—the cultivation of cereals and the production of milk; fourth—special crops requiring particularly good and stable production conditions. Thus, zones more distant from large urban agglomerations represent a potential that is particularly valuable for the production of organic food, achieving prices on the market above standard prices (Sinclair, 1967).

Economic theories of the location of agricultural production focus on various model studies, taking into account spatial land use, interregional balance in terms of optimization of decision-making, and taking into consideration risk and uncertainty, competitiveness and diffusion of innovation (Becla and Czaja, 2004).

In models of industrial production location, environmental protection problems are more and more often taken into account with the use of linear and non-linear programming methods. M. Ronsard (1992) distinguishes the four research fields in the discussed scope of exploration that were most important at the time.

Models of spatial interactions

These are now inspired by Newton's law of universal gravitation. The purely economic justification of the use of gravity models, which constitute a specific theoretical basis, brings interesting results. According to M. Ronsard, "the importance of spatial interaction models is so great that one can also see paradigms in them". In this field, two main directions of research can be distinguished: flow models and potential models based on the notion of the spatial system and entropy, the utility of the function of the number of displacements and destination characteristics. It should be noted that the social nature of spatial interactions limits the possibility of their strict expression.

General spatial balance theory

Its aim is to analyze the conditions of the existence of equilibrium of all economic activities, considered in mutual dependencies, spatial systems and with the requirement of optimality. It is inspired by the contemporary works of A. Lösch. General equilibrium does not necessarily confirm the conditions of a social optimum. Economic spatial balance is a situation where supply and demand are balanced in all spatial markets, and the location of pro-

ducers is established internally. The discussed theory ultimately leads to welfare economics in a spatial-regional context (Ponsard, 1986).

The theory of spatial public economy

This focuses on the optimal location of public services in terms of spatial welfare criteria and the social optimum. These studies are mainly microeconomic in nature, both positive and normative. In relation to the traditional economy of public choice, public spatial economy is distinguished by the enrichment of research issues with the issues of participation of many institutional units and development of the area from the point of view of spatial analysis of economic systems.

Analyses of fuzzy economic spaces and unspecified spatial behaviours are at the starting point and aim at formulating the theory of general spatial equilibrium in a fuzzy context, i.e. inaccurately defined economic systems in space. It is believed that C. Ponsard was a pioneer who initiated the reformulation of economic theory using the fuzzy set theory (Ponsard, Fustier, 1986). Summing up the considerations on contemporary research trends, one can notice great progress in the integration of the science of traditional economics with spatial economy, although, according to M. Blaug, there are still significant areas of neglect in this respect (Blaug, 1994).

5. The theory of spatial development—regional and local

According to A. Sobczyk, development is a process of positive changes, both quantitative and qualitative. It appears as part of social life. It can also be visible in the conditions of operation of individual economic entities and takes into account the needs, priorities and preferences or the adopted value systems of the local community and entrepreneurs. This development is built through:

– employment and creation of new jobs;
– activities of business environment institutions;
– creating a high-quality environment; and
– human capital and its development.

This means that the most important elements of regional development are: economic potential, as well as economic structure and the natural environment, in addition to infrastructure development, spatial order, living standards of the inhabitants, and spatial development (Dahlke, 2017).

Development is a process of changes that occur at a specific time within a regional or local system (economy) with the definition of goals, needs, preferences, values and tasks. Goals are usually considered through (Dahlke, 2017):

– the needs of the population and their satisfaction;
– use of the resources available to enable economic development;
– ensuring sustainable development.

The goals of regional development are most often defined as:

– economic (increase of national income, improvement of management efficiency, creation of a knowledge-based economy, investments, elimination of unemployment);

– political (development of the political activity of the society, building a civil society, elimination of social inequalities);
– biological (life expectancy and quality, improvement of health care efficiency);
– organizational and spatial (maintaining spatial order in the light of social and location rationality);
– ecological (reducing pollution, rationalizing the management of raw materials and waste).

Each goal is related to tasks to be implemented, included in strategic programmes, and finally in the assumptions of a specific socio-economic policy.

The theories of regional and local development can be divided into three groups (Gałązka, 2017):
– theories identifying the root causes of business activity in a specific space—which is often identified with location theories;
– organizational and technocratic theories that emphasize the activities carried out by economic entities, taking into account the social and economic environment;
– theories focusing on the role of external conditions and activities of economic entities, taking into account processes promoting efficiency in the economic activity conducted.

In general, these theories assume that the development discussed here is identified with a long-term process of directional changes. It usually takes place in stages, from simple to more complex forms (states). It allows for the creation of a territorial system with optimal living conditions in the social environment, using endogenous resources in development. Through development, local authorities obtain tools that allow them to meet the needs of residents and carry out public tasks.

In ensuring sustainable (integral) regional and local development, rational and optimal use of resources, assets and factors is indicated. Their classification according to J. Falkowski is presented in Table 1.

Table 1. Distribution of resources, assets and key factors allowing for full local development

Resource	Assets	Factors
nature	natural	mineral, agricultural and forest resources, water, landscape, nature reserves and monuments, nature protection, etc.
culture	architectural and urban	cultural sites: architectural monuments, memorials, museums and open-air museums, archaeological sites, etc.
demographic and social	human capital	age and gender structure, education, qualifications, employment, migration, etc.
economic	fixed assets and finance	enterprises, capital resources, investments, transport and connectivity, services, business environment, etc.
technological	new local technologies	innovation, competitiveness, consulting, ICT infrastructure, etc.
planning	planning and strategic	study of the conditions and directions of spatial development, local development strategies, etc.
organizational	administrative and local government	organization and management, fundraising, investment projects, etc.

S o u r c e: Falkowski, 2016, p. 57.

In the dimension of local development, the following conditions are taken into account (Orłowska, 2017):

– socio-cultural, including demographic;
– economic;
– infrastructural (technical and social);
– environmental (natural);
– spatial (aspects of spatial management).

According to J. Orłowska, the factors of local development are considered: from *the traditional point of view* (the number of companies and jobs, the roles of traditional sectors, comparative benefits based on physical assets, knowledge possessed by the staff) and from *the point of view of the modern perspective* (creating high-quality jobs, also creating new institutions supporting economic activity, comparative benefits, based on the quality of the environment, knowledge—a generator of socio-economic development). The most important development factors are commonly considered to be: employment, development base (resources), location and knowledge (Orłowska, 2017).

According to M. Warczak, the classification of development factors into internal and external is presented in Table 2.

Table 2. Internal and external factors of local development

Development factors	Internal	External
Political-systemic factors	– The level of acceptance of local authorities by society – Relationships between local authorities and society	– The scope of self-government and independence of municipalities – The nature of power (state system) – The scope of powers (powers of authorities at various levels)
Social factors	– Needs, values and ambitions of the local community – Approach to reform, innovation and technological progress – Creativity and entrepreneurship	– Features of the community that go beyond the local space – Culture, traditions of the wider territorial system
Economic factors	– Economic, social and technical infrastructure – Local economic and investment opportunities	– The economic condition of the country – The rate of inflation – Unemployment rate – External capital and investment
Spatial factors	– Natural resources – Positive features of the natural environment – City landscape	– Supralocal environmental conditions – Ecosystems that go beyond the local government unit

S o u r c e: Warczak, 2015, p. 115.

Speaking of local development, it is worth pointing to some of the more important barriers (limiting factors) to effective regional and local development. These barriers include (Dahlke, 2017):

– methodological (errors in development management);
– legal (imprecise legislative acts);

– resulting from the shortages of social (human) capital;
– financial;
– personnel, including personal barriers of local authorities;
– information (data access restrictions);
– support (in accessing services and resources);
– resulting from development policy (incoherence and other shortcomings).

Among local government tasks in the field of local development, attention should be paid to the role of the municipal services sector, which is most widely considered in terms of: socio-cultural (transport, water supply, sewage), environmental (environmental protection, waste management), economic (economic potential, labour resources and investments), infrastructure. For the purposes of local government tasks in the spatial dimension, it is necessary to:

– create an optimal view of the social and economic spatial structure;
– create an effective functional system;
– have effective and economical land management;
– have protection of resources and assets of the natural environment and cultural heritage.

Spatial planning and policy as well as development strategies play an important role in defining these goals and tasks.

6. New aspects of planning, order and spatial policy in Poland

In the historical perspective of planning in the countries of "real socialism", in practice, national economic plans were in force, e.g. in Poland: a 3-year plan for the country's reconstruction (1947–1949), a 6-year plan for the industrialization of the country (1950–1955), and then 5-year plans. Planning gradually evolved towards fulfilling programme and prognostic functions. With the transition to the process of political and economic transformation from 1989, the further evolution of planning was towards increasing the role of strategic planning (*Wielka encyklopedia powszechna PWN* [Great universal encyclopedia], 2004). In Western (capitalist) countries, a form of indicative planning was widely used, mainly oriented towards programming and forecasting.

Along with the processes taking place in the contemporary world economy, i.e. globalization, integration and liberalization, there are processes of adjustment of national economies, including Poland. Structural and functional changes in the Polish economy, in line with the requirements of a democratic political system and an effective market economy, force constant changes, including in the management of the economy, i.e. management and planning, along with the processes of system transformation, association with the European Union and then full membership from 1 May 2004.

Planning in the macroeconomic scale and in Poland requires new aspects of spatial development to be taken into account in the light of the necessary legislative changes, compatible with the regulations of the European Union. Planning is a process of creating and making decisions in which participants take part in the conditions of decentralization of decisions and freedom of action of economic entities. Professionalization of these activities causes the separation of activities preparing planning projects from the act of making operational decisions. Specific plans define the purpose and use of the land for individual economic and social purposes. Therefore, spatial planning is closely related to social planning concerning

social aspects of economic programming, and remains one of the elements of a separately formulated strategy for socio-economic development. In the territorial approach, planning is classified into national, regional, local and specific related to, for example, urban planning.

Later in the study, the main aspects of planning at the national level will be presented, including their compatibility with the EU planning and regional and local planning. In the article, the above-mentioned planning is also presented in the context of mutual relations with the separately developed development strategies and the executive side, i.e. the economic policy of spatial development.

6.1. Spatial planning at the EU and national level: Development strategies

The European Charter for Spatial Planning states that "territorial planning is an important instrument of socio-economic development for ensuring sustainable development of regions, increasing living standards of the population, regional development, increasing living standards and rational use of resources and space".

As part of the cooperation of the EU countries, the Council of Europe and the European Commission, in the field of development of the European territory, annual reports are prepared that are used to develop the *European spatial development plan* by the appointed Spatial Development Committee.

On these premises, and based on the previously conducted strategic analysis, the concepts of spatial policy in the EU are formulated. The development strategy is recognized as a key strategic planning and management instrument. In the EU, this was the *"Europe 2020" strategy* and one now being prepared for the coming years.

The national development plan is equated with the national spatial development plan and is the framework basis for the preparation of regional plans and local spatial development plans for poviats and municipalities. The long-term "national spatial development concept 2030" has been developed at the national level. The legislative basis for these activities is the *Act on spatial planning and development*, along with newer regulations, adopted on 27 March 2003 (Journal of Laws No. 80, item 717, as amended). The overriding document for the above-mentioned plan was: the interim *National development strategy 2020* (along with the Diagnosis for the needs of this strategy) and the later prepared and supplemented *Strategy for responsible development 2020*, which formulated a new vision and development model implemented by the country's current government team (Ministry of Regional Funds and Policy, 2020).

6.2. Spatial planning in the voivodeship: Strategy and policy of regional development

Along with the decentralization of the state's functions in the transformation process, the adoption of a new territorial and administrative division and the development of self-government at the regional level, in the 1990s new legal regulations concerning spatial planning and regional policy were adopted (*Act of 5 June 1998 on voivodeship self-government*, Journal of Laws 1998, No. 91, item 576, as amended). Currently, in Poland, a region is defined as an area corresponding to a voivodeship in the new administrative division.

Planning at the regional level is based on the voivodeship spatial development plan. It takes into account the earlier studies of the *Study of the conditions and directions of spatial development* and the *Strategy of regional development*. The voivodeship spatial development plan includes the basic elements of the settlement network, the system of protected areas, the distribution of public purpose investments of more-than local importance, in particular technical and social infrastructure, as well as requirements for protection of the environment and cultural assets, and support areas.

The early documents containing the strategic analysis of the development of the country's regions include: *National strategy for regional development 2001–2006*, *2007–2013*, and in the following years together with separate studies, e.g. *Development strategy for the Lesser Poland Voivodeship 2011–2020*.

Regional policy gives territorial dimensions to the overall development policy and indicates various active undertakings aimed at directing positive changes in spatial arrangement. Its aim is to rationally shape changes in the structure and spatial development of the economy and population (Winiarski, 1995).

Regional policy is characterized by two approaches: inter- and intraregional. The first relates directly to the powers of the government and the voivodes. The second includes projects and activities undertaken by local government authorities. Planning and regional policy remain compatible with the European Union, including its financing from aid funds (*Act on the principles of supporting regional development of 12 May 2000*, Journal of Laws No. 48, item 350).

With membership of the EU, Poland gained a large amount of aid funds, including structural funds, especially in the agriculture and rural areas.

6.3. Spatial planning at the local level: Strategy and policy development of municipalities and poviats

One of the first documents adopted by the Sejm of the Third Republic of Poland was the *Act on local self-government of 8 March 1990* (Journal of Laws 1990, No. 16, item 95) and then the *Act of 5 June 1998 on poviat self-government* (Journal of Laws 1998, No. 91, item 578). The municipality is therefore the basic unit of local self-government, which is the subject of regional and local policy. The municipality is also a subject of public and private law with the adopted principle of general competence in local matters. It carries out its tasks through the municipality council. Public tasks financed from the municipality's budget relate to the widest extent to its development, spatial order, local economy and environmental protection. The tools adopted by the municipality authorities in local development policy include spatial management, preceded by the following studies: the study of spatial conditions and development and the municipality development strategy (as supporting documents, not obligatory). The municipal spatial development plan remains the final document. With the definition of goals and executive tasks—programmes and strategies are prepared, reflected in the adopted assumptions of socio-economic policy. The local government authorities of the municipality are responsible for the preparation of the development strategy, based on the opinion-forming activity of the local society. The methodological basis for the formulation of the strategy is usually a strategic SWOT analysis—strengths and weaknesses as well as opportunities and

threats to development, mission findings and main directions of decision-making activities in strategic planning and management (*Wielka encyklopedia powszechna PWN*, 2005).

The mentioned SWOT method is universal, so it can be used at all decision-making levels and in various micro- or macroeconomic studies.

Local plans include, inter alia, areas where public purpose investments will be located and areas for the distribution of commercial and other facilities that will increase employment.

7. Conclusion

Research on the space of location and spatial order shows that the process of spatial economy penetrating into theoretical research of conventional economics is systematically taking place. One can agree with C. Ponsard (an outstanding representative of spatial economy) that the real economic world, and thus also the spatial world, is more complex than can be judged on the basis of the theory of traditional economics.

Space is a place of business and urbanization. It is, in fact, an economic and social space that conditions real management processes, based on rational and optimal resources, and finally on spatial order, ensuring sustainable and balanced development.

In striving to achieve such goals and tasks, an important role is played by the theory presented both by traditional and spatial economics and contained in paradigms historically shaped by J. H. von Thünen, A. Weber, H. Hotelling, W. Christaller and A. Lösch, and especially more recent authors such as O. Jonasson, W. Isard, R. Sinclair, C. Ponsard, and others.

In the light of the above considerations, the transition to the theoretical perception of spatial development is of great importance. In our view, it is most widely related to regional and local development (apart from being treated separately throughout the country, and even integrated within the EU).

The higher stage of organization in this field is the transition to planning and spatial policy, including the regional and local perspective. The new aspects of planning in Poland, adopted since the 1990s, as part of the processes of decentralization and the creation of a market economy and integration with the EU, take into account the requirements of strategic planning and management based on relevant legislative regulations. An important instrument prepared earlier for these activities is the strategic analysis document (*Development strategy*) at various levels of the territorial and administrative division of the country.

This study outlines spatial planning, development strategy and policy in voivodeships and municipalities in the light of the national and EU approaches.

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Ekonomia i ład przestrzenny. Planowanie a polityka rozwoju regionalnego i lokalnego

Abstrakt: W artykule przedstawiono zarówno teoretyczne, jak i praktyczne aspekty działalności społeczno-gospodarczej w przestrzeni kraju, regionów i gmin. Zwrócono uwagę na formułowanie teorii lokalizacji i ładu przestrzennego w ekonomii przestrzennej, zawartych w głównych paradygmatach J.H. von Thünena, B. Webera, H. Hotellinga, W. Christallera i A. Löscha, a także w nowszych (współczesnych) teoriach W. Isarda, R. Sinclaira i C. Ronsarda. W dalszej części opracowania omówiono w zarysie teorie rozwoju przestrzennego-regionalnego i lokalnego. Na tej kanwie w artykule przedstawiono nowe aspekty planowania, ładu i polityki przestrzennej w Polsce, z uwzględnieniem szczebla krajowego, regionalnego (województw) oraz lokalnego (gmin i powiatów). W wyżej omawianej tematyce uwzględniono kompatybilne zagadnienia poprzedzające planowanie, tj. przygotowanie strategii rozwoju, a następnie założeń i wdrażania w praktyce gospodarczej polityki rozwoju regionalnego i lokalnego.

Słowa kluczowe: ekonomia konwencjonalna i przestrzenna, lokalizacja, ład przestrzenny, planowanie, teoria rozwoju regionalnego i lokalnego, polityka przestrzenna

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Products offered by a startup and the quality of human life

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Abstract: The development of modern economies is determined by many factors. One of the most important is the use of the new technologies and innovations, which at the same time enable the introduction of solutions in the field of Industry 4.0. The form of organization oriented towards innovative solutions is a startup. The aim of the article is to show the relationship between the product offered by a startup and the quality of human life. It is important how and on what levels startups function in today's reality and how their activities can affect the quality of human life. The implementation of the chosen goals was possible thanks to the study of the literature on the subject and the conduct of a questionnaire survey. The work also presents a case study of a Polish startup, the product of which is an innovative solution that can be used when ordering meals online for employees. The offered product affects the quality of users' work, making it easier for them to order and plan a meal at work. In addition to saving the time needed to prepare a meal or go to a restaurant to eat it, it should be reflected in their well-being or work efficiency. The survey provided information on how online ordering of meals is perceived by application users.

Keywords: startup, quality of life, innovative product

1. Introduction

Gaining a competitive advantage in a changing and complex environment becomes the main challenge for the twenty-first-century organizations. It is possible thanks to the resource, which is knowledge, which also reflects the level of economic development of the country. The ongoing fourth industrial revolution presents organizations with new challenges related to, for example, progressive digitization. The fact that the organization is not oriented towards flexible adaptation to the environment means that it is often not competent to introduce new technological solutions. Then again, a startup that delivers innovative solutions using modern technologies to the market may have these competences.

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Currently, organizations are facing an increase in the level of quality of life thanks to the introduction of new technological solutions. In turn, these solutions are largely possible thanks to a startup.

The aim of the article is to show the relationship between the product offered by a startup and the quality of human life.

It has become important to determine how and on what levels startups can affect the quality of human life, also taking into account their participation in the fourth industrial revolution. **It becomes purposeful to answer the question—whether startups have a positive impact on the quality of human life.**

The achievement of the chosen goals was possible thanks to the review of the literature on the subject, conducting a survey and presenting a case study. An attempt was made to examine the impact of a specific startup's operation on the quality of human life and to assess the quality of the product delivered by it.

2. Startup and the quality of human life

A startup is a special type of organization focused on innovation (Paoloni and Modafferi, 2018). S. Blank (2013) writes that a startup "is a temporary organization that is looking for a repeatable and scalable business model". Organizations of this type are characterized primarily by: independence, innovation, ability to respond to customer needs, business scalability and uncertainty. Startups have relatively low start-up costs, a much higher risk of ventures than standard organizations and a high return on investment, higher than in the case of ordinary ventures (Łopusiewicz, 2013). No wonder that statistically most startups (about 60%) fail in the first stage of operation, i.e. 3–5 years after their inception (Melegati et al., 2019; Mukti et al., 2019). Thus, startups are characterized by both high risk and the possibility of growth due to the fact that from the beginning of their operation, they are aimed at expanding the scale by entering the global market (Law, 2017).

Startups are highly flexible, which increases the possibility of implementing new solutions by them compared to traditional organizations. Therefore, often establishing relationships with startups turns out to be more economical from their point of view than hiring experts to achieve specific goals on their own. Startups have innovative, invaluable knowledge that cannot be acquired or created by organizations operating in accordance with traditional principles. The cooperation of traditionally functioning organizations with startups becomes common during the process of generating innovation (Moschner et al., 2019). Startups can be of key importance for the quality of operation and development of an organization, because thanks to them they gain the ability to introduce innovations and offer much better solutions to their clients (Bărbulescu and Constantin, 2019). Moreover, startups have enormous potential to increase innovation and competitiveness not only of the organizations themselves, but above all of the economy (Skawińska and Zalewski, 2020). Lozano and Petros (2018) write that startups offer intelligent solutions that are more inventive and valuable than before. Their focus on the continuous development of innovations and their implementation is the foundation for creating a knowledge-based economy, preferring the principles of sustainable development. Fast-growing organizations most often rely on new technologies and innovations based on a large amount of information and data (Burnat-Mikosz et al., 2016).

Social inequalities and the low standard of living in some parts of the world are the subject of economic analysis and research. The problem is the marginalization of the needs of a large group of people who are unable to meet them at the expected level (Kalinowski, 2017). Especially now, during the Covid-19 period, the growing negative socio-economic phenomena, including unemployment and pauperization of the society, is becoming visible. According to social and economic policy, both at the national, regional and local level, increasing the quality of life of the society should be considered as the overriding goal. In the European Union, there is a visible striving for a balance between economic development and social development, while preserving the natural environment and cultural heritage. Also in Poland, in the Long-Term National Development Strategy until 2030 and the Medium-Term National Development Strategy 2020, great emphasis is placed on improving the quality of life of Poles by ensuring stable and high economic growth (Panek, 2015).

The term *quality of life* is used on many levels and interest in this concept is still growing. Nevertheless, there is no uniform definition in the literature that would define this category. "Quality of life" can be considered in many dimensions, including social, cultural, medical or economic (Petelewicz and Drabowicz, 2016). The quality of human life is an interdisciplinary concept, and its assessment is usually based on multi-dimensional procedures. Macroeconomic indicators (e.g. GDP, unemployment rate), health, education and subjective factors such as individual happiness or family and community relations are important (Szernik et al., 2019).

The assessment of the quality of life is influenced by such factors as, for example, education, health, social contacts, personal activity, public voice and influence on decisions made, the natural environment, as well as economic and personal security (Stiglitz et al., 2013). It should also be emphasized that the quality of life also depends on factors such as: productivity, material living conditions, economic and physical safety, leisure and social contacts, fundamental rights, the natural and living environment, as well as on general life experiences of a human (Łańcucki, 2015).

Human economic activity and all activities undertaken to improve the level of its efficiency and effectiveness are aimed at creating things, conditions or solutions that will improve the quality of human life (Łukasiński, 2017).

The concept of quality of life is ambiguous, open and multi-faceted. Kolman writes that the quality of life is the degree to which a person's spiritual and material needs and their requirements are satisfied. Therefore, it is a certain level of meeting the expectations in the "normality" of the implemented activities, as well as in the everyday life of the individual and the whole society (Kolman, 2000). According to Borys (2007), the quality of life is "a category expressing the degree of human self-realization in a holistic approach (with the balance of well-being, well-being and bliss) or in a more or less narrow sense, e.g. from the point of view of consumption of material goods that satisfy his needs (with the domination of welfare over welfare and bliss)".

The quality of life can be talked about as the degree of satisfaction of specific and varied needs which, in the objective approach, are objective living conditions of people measured by variables. Alternatively, according to the subjectivist approach, it is human satisfaction in various zones of life and the level of their feeling (Chmielnicka, 2004). The subjective

assessment of an individual plays a decisive role in the process of determining the quality of life category. Moreover, the quality of life may evolve under the influence of social, economic or ecological factors.

In terms of social policy, the quality of life is combined with social needs. Satisfying these needs is identified as the overriding goal of social development at all levels, i.e. local, regional, national and international (Panek, 2016).

It seems that the improvement of the quality of life should be significantly influenced by the development of digital technologies, which is a new challenge for the organization (Łańcucki, 2015). The industrial revolution is not only changing traditional business models, but redefining entire industries.

Platon defines quality as "a certain degree of perfection". In the literature, however, the most common definition is that quality is a certain degree of meeting customer needs. It can be assumed that quality is "a set of characteristics of goods or services during their purchase, which contribute to satisfying customer needs" (Drapińska, 2007). From the client's point of view, one can speak of perceived quality, and thus his subjective feeling. From the point of view of the organization or management, it is important to obtain, above all, objective quality, which is closely related to meeting standards. Product quality plays an important role in building a competitive advantage, and identifying and meeting customers' needs through it often determines the success of the organization and improves the quality of life (Cruz and Mendes, 2019). A startup is an organization which, by its nature and basic assumption, should be able to provide innovative value to the client, and thus respond to clients' needs and significantly improve the quality of their lives.

Products offered by startups are a response to customer needs. They largely solve the problems faced by users. Startups are distinguished by the ability to produce products with a high level of added value thanks to the convergence of industries and technologies in line with the ongoing fourth industrial revolution (Marwick, 2017). The improvement of the quality of life is influenced not only by the solutions proposed by the startup, but above all by their quality.

Currently, customers are more willing than before to give up having a large amount of exclusive resources in favour of sharing. In turn, Big Data and analytics power artificial intelligence and study their behavior as well as communication, nutritional and health habits in order to then identify their needs and suggest solutions. This phenomenon aims to provide customers with the right product, at the right time and place. It can therefore be concluded that the technologies not only improve and develop the functioning of the organization and the economy but most of all improve the quality of human life.

While reviewing the literature, one can find more and more research results confirming that startups are one of the most important channels of socio-economic development, changes in industry and a source of renewal (Passaro *et al.*, 2020). Thanks to the ability to shape innovation and use new technologies, startups have not only great opportunities to support the transformation of local areas, but also entire economies.

Startups increase the innovativeness and competitiveness of the national economy, having the competence to effectively and flexibly meet the needs of customers that exist or appear on the market (Skawińska and Zalewski, 2020). What's more, startups are considered to support a sustainable economy. Thanks to innovation, they are able to introduce pro-environmental

and pro-social solutions to a greater extent than the traditional ones (Hall et al., 2010). An organization's learning ability affects the quality of its competences. This is reflected in the style of leadership, behaviours and attitudes of employees, organizational culture, increasing the chance for sustainable development of the organization (Bilan et al., 2020).

A startup can achieve a competitive advantage thanks to the synergy of human competences and modern technologies (Chursin and Strenalyuk, 2018). Therefore, the key factors determining the quality of the functioning and development of a startup include: leadership, employees, the ability to develop technological and adherence to the principles of sustainable development. The resource of knowledge, not only technological, but also practical, coming mainly from the leader and employees, should also be considered an asset of a startup, as the startup development process is driven by their competencies (Tsolakidis et al., 2020).

All these activities have a significant impact on the quality of human life through, e.g. creating ergonomic workplaces or optimal management of waste generated as a result of the production process.

3. A startup and its product—a case study

Online shopping has become popular in recent years. The number of online stores is growing, and the growth of the online retail market is becoming visible. It means changing the behaviour of people who are opening up to new distribution channels. The economic motives for buying online are becoming apparent, and they are perceived by sellers who understand the importance of the added value of making this type of sale. This value usually depends on a set of factors that make it attractive to buy. What is important, is the price, quality of service, ease and speed of making a purchase, or its safety (Vaitkeviciu et al., 2019).

An example of a startup that provides an innovative service is a Krakow organization. It created an online canteen for online ordering of meals by office workers. This organization created an innovative product that solved the problem of users related to the daily ordering of meals at work and the problem of subsidizing meals by organizations. Among other relatively similar solutions in the field of ordering meals on the market, this startup stands out:

- a strictly defined group of recipients (employees of the organization);
- mode of operation (grouping orders by area and delivery time);
- sustainable development;
- an individual offer prepared for customers, taking into account their preferences;
- innovative mobile and web application for clients, restaurants and employers.

Moreover, the Krakow organization has several characteristic features of a startup. It should be noted that:

- its development is financed by founders and external investors who have a huge influence on it;
- it delivers an innovative product to the market;
- it is still looking for a scalable and repeatable business model;
- each of its strategic actions carries a considerable risk of failure;
- it is more concerned than other organizations with the uncertainty related to, for example, the crisis related to the Covid-19 pandemic.

Gaining a competitive advantage for a startup is possible thanks to the proper grouping of customer orders (logistics aspect), an application that determines fast and effective ordering of meals (technological aspect) and the efficiency of the Customer Service Office (social aspect).

Technological development determines the delivery of the expected quality of the product to users, full adaptation to their needs. It would not be possible without the co-financing from the Venture Capital fund, thanks to which the development of the startup and its product have been financed for a year. Thanks to the support received, the application develops at a very dynamic pace, introducing newer and newer system improvements. These activities contribute to increasing comfort and quality for employees, employers and restaurants using the application. In addition to the development of the web application, the mobile application for customers and restaurants is also being developed.

The Krakow startup fits perfectly into the principles of Industry 4.0, as it primarily provides the market with innovation that drives economic development. In addition, it operates in accordance with the principles of sustainable development, on which Industry 4.0 is also based. In its operation and development, the startup uses technologies developed during the fourth revolution. The Krakow startup is managed by an experienced manager who, together with his team, has been working intensively on the development of the application for two years. It is important that the team consists of young and ambitious employees who focus on the development of both their own and the organization.

The surveyed startup currently employs about 20 people who are working on new solutions to meet the needs of various stakeholder groups. The startup operates in accordance with the principles of sustainable development, which means that both managers and employees strive to meet the needs of not only the present, but also future generations. In the Krakow startup, the actions taken on a daily basis prove compliance with the principles of sustainable development. The ability to group orders and plan deliveries is important, allowing restaurants to combine them into one overall course. Thus, the driver covers considerably fewer kilometres during the working day, for example improving the air quality in the city. The website promotes biodegradable packaging, so that each customer can make an informed choice. Customers were provided with an original poster, through which the organization tries to teach employees to properly segregate packaging after eating lunch. It is also important that the dishes are ordered without plastic cutlery. It seems that the above competences contribute to the improvement of the quality of human life.

Every day, customers can place an order by 10:45 from the restaurant offer available on the website. Each restaurant carries out orders at lunchtime within a strictly defined time frame. The startup does not charge any additional delivery fees and does not require a minimum order amount, the employee can order just a soup. Thus, the user can plan his meal for a given day and adjust the lunch break to his daily schedule. The customer settles accounts once a week, which also greatly facilitates the ordering process and shortens its time.

A startup allows employers to partially or fully subsidize their employees' meals. In this way, companies can introduce an additional and very important benefit for employees. It has a very positive effect on the quality of work/ life and the efficiency of employees, additionally saving their time for preparing meals at home, or devoting it to ordering dinner in other ways during work.

The restaurant receives grouped orders along with the delivery schedule. They are being realized according to it at lunchtime from 12:00 pm to 2:00 pm. Orders are left in a designated place in a given company. At this point, a delivery notification is sent to the application or e-mail to all users who placed an order on that day. The supplier does not have to wait for customers, because each order is described with an individual customer code, on the basis of which he identifies his order, and the settlement takes place online.

When handling such orders, the restaurant gains a standing order, which, due to its nature, allows it to efficiently plan the demand. At the beginning of cooperation, each of them determines its supply range and production capabilities. He also gets access to his panel to manage the menu and view orders and to the application aimed at confirming deliveries, as well as preparing the optimal delivery route. It is worth paying attention to the fact that a startup through the created system, thanks to technology, connects employees/ companies and restaurateurs.

The startup also reacted swiftly to the effects of the Covid-19 crisis. It extended its service to home deliveries of remotely working employees. Thus, employees do not have to waste time cooking or spend extra money on delivery costs. Even in this difficult period, when most benefits have been withheld, the employer can still provide it to employees. Then again, orders continue to flow to restaurants, which are often one of the main revenues during a pandemic. Deliveries are contactless, and customers receive information via the application that an order is waiting at the door. In 2020, a blog was also created, where the startup periodically publishes information on nutrition at work, as well as information on safe deliveries during a pandemic. Thus, the startup additionally educates its clients and raises their awareness about proper nutrition.

The presented example of a startup and the technological solution it offers have a positive impact on the quality of life and is in line with the goals of Economy 4.0. Thus, it proves that startups and the products they manufacture have great chances to meet the needs of customers, supporting the development of the ongoing industrial revolution.

Quality for customers is one of the most important features of the product. Researching their opinions helps to improve the quality of the product and adapt it to their needs, which has a positive effect on improving the quality of life. A Krakow startup, through the provided application that allows ordering meals, can effectively affect the quality of human life.

In order to assess the quality of functioning of the offered application, a questionnaire survey was carried out among customers using it. The survey was conducted on a group of 300 customers answering the survey questions. The study was conducted from March to May 2020 in Poland. In order to conduct it, a questionnaire was used, which was made available on the Internet. 65.3% of women and 34.7% of men took part in the study. The study group was dominated by people with higher education (67%), the remaining 34% were people with secondary or less education.

The respondents were asked, inter alia, about the most accurate definition of product quality in their opinion. This was to determine the perception of quality by the respondents using the application. Each of them could indicate one definition. The results are presented in Figure 1.

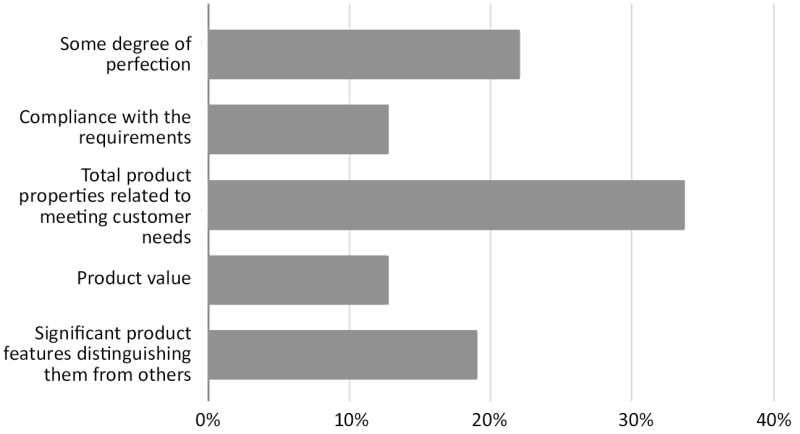

Figure 1. Definition of product quality

S o u r c e: Authors' own elaboration based on the survey conducted by the respondents.

Most of the respondents indicate that for them quality means all the properties that are related to meeting the needs of consumers (33.7%). The product value (12.7%) and compliance with the requirements (12.7%) turned out to be the least appealing definition of quality to consumers. It follows that product quality is associated with providing specific solutions that may positively affect the quality of life level. This is also the solution provided by a startup.

In the next question, respondents were asked to assess the extent to which individual factors affect the perceived quality of the product provided by the startup. They rated them on a scale of 1 (least significant) to 5 (most significant). The results are presented in Table 1.

Table 1. Assessment of factors influencing the perceived quality of the product provided by a startup

Factors	Average	Median	Dominant
quality and safety of a delivered meal	4.29	5	5
appropriate taste, look and smell of a meal	4.22	5	5
punctuality of meal's delivery	4.16	5	5
ease and safety of using the application	4.09	5	5
online payment option	3.99	4	5
no additional delivery costs	3.83	4	5
possibility of receiving discounts on ordering meals	3.65	4	3
no difference between on-premises and online price	3.63	4	5
rich and varied offer of restaurants from which you can order meals using the application	3.61	4	3
possibility to choose the time of delivery of the meal	3.60	4	5
preview—what happens with the ordered meal	3.52	4	5
the daily amount of lunch options	3.36	3	3

S o u r c e: Authors' own elaboration based on the survey conducted by the respondents.

The results indicate that the most important for users is the quality and safety of the delivered meal, its appropriate taste, appearance and smell, and timely deliveries. The factors with the highest average show that application users pay the most attention not so much to the technical aspects of the application, but to the quality and safety of meals. Therefore, it is crucial that the organization selects the restaurants that appear on the website selectively, as it must be responsible for the quality of the meals provided. In turn, the last two factors related to the number of restaurants on offer and their extensive menu show that a startup, by selecting restaurants and narrowing down the menu, often makes it easier for employees to choose, shortens the ordering time and, as a result, provides only valuable options for which they can be held responsible.

On the basis of the obtained results, it should be stated that each of the above factors affects the quality of life of users, as none of them received an average score lower than 3. Moreover, high scores dominate in most of the factors. The respondents gave each of them usually one of the highest marks (4–5).

The application created by the startup affects the quality of life not only through the features that facilitate ordering, but above all because everyone can easily stock up on food at work, in this case an important lunch. The next respondents were asked to indicate the three most important factors for them, which are important when ordering via the application. The results are presented in Figure 2.

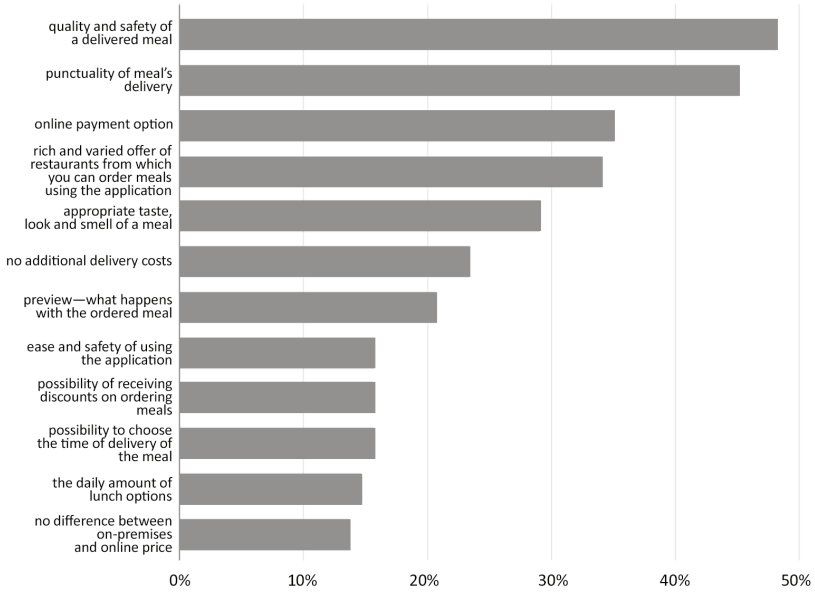

Figure 2. Key factors determining the success of a product provided by a startup

S o u r c e: Authors' own elaboration based on the survey conducted by the respondents.

On the basis of the obtained results, the following key factors should be considered: the quality and safety of the delivered meal, punctually of meals's delivery, online payment. The fewest indications were for the following factors: no difference between the price in the restaurant and online, as well the daily amount of lunch options.

The quality and safety of the delivered meals affects human health, which is one of the key aspects of the quality of human life. The results of the study show that customers pay attention to what they order, thus taking care of their health. In turn, a startup does not only provide a technological solution affecting the quality of life, but above all, it offers a specific lunch offer aim at providing a valuable meal during work. The factors indicated by the respondents which they considered the most important also directly affect the quality of life. Based on the above results from the survey, it can be concluded that the solution created by the Krakow startup has a positive effect on improving the quality of human life.

4. Final remarks

The fourth industrial revolution is currently underway. Successive organizations are trying to flexibly adapt to changes in the environment. Startups offer innovative solutions. Innovations and modern technologies used within its framework, as well as startups, give the opportunity to shape solutions, influencing the increase in the quality of human life through the facilities that organizations provide to the market for people.

Summing up, it should be stated that startups significantly improve the quality of life. It proves that startups:

- use market niches and offer innovative products to better meet the identified new consumer needs;
- promote pro-social and pro-ecological solutions that have a positive effect on the level of human health, giving the possibility of preserving the natural environment in an unchanged (improved) condition for future generations;
- they often promote risky solutions that bring them success and have a positive impact on improving the quality of functioning of mature organizations;
- use new technologies (e.g. IT), favour the development of competences of their employees;
- they provide opportunities for people to be creative and inventive (especially for young people), to gain more independence in the decision-making process or to implement activities.

Presenting the example of a Krakow startup was to show how startups improve the quality of human life in a practical way. The analysis of the literature and the presented results from the survey show that various factors contribute to the improvement of the quality of life. In the case of the above-mentioned startup, the quality of life is primarily influenced by the quality of the meals provided and the safety of eating them. Alternatively, the very solution proposed by the surveyed startup improves the quality of life, among others through:

- improving eating habits, increasing the possibility of eating meals regularly, reducing the loss of time necessary for preparing or ordering a meal during work;
- improving work efficiency;
- reduction of pollutant emissions thanks to the grouping of orders;
- educating employees on healthy eating and waste segregation;
- the possibility of integrating the crew while eating lunch together at work, which should improve the well-being of employees.

In conclusion, it should be said that compliance with the principles of Industry 4.0 or the role of startups in the ongoing revolution have a positive impact on improving the quality of human life and respond to their needs. It can certainly be said that the described startup operating in Krakow is an innovative venture. The product it offers is both an innovative solution and a tool for ordering meals. Its advantage is the ability to connect different groups of stakeholders, meeting their needs. The principles of Economy 4.0, the variable and complex environment are conducive to the creation of startups, which should be oriented towards creating solutions positively influencing the quality of human life. Nowadays, the global market makes it possible to gain a competitive advantage only to those who will offer solutions that satisfy the customer. Therefore, it becomes necessary to shape the competences of organizations that determine the creation of innovative solutions that have a positive impact on the quality of human life.

5. Summary

The development of modern economies is determined by many factors. One of the most important ones is the use of the latest technologies and innovations, which at the same time enable the introduction of solutions in the field of Industry 4.0. A startup is a form of organization oriented towards innovative solutions.

The aim of the article is to show the relationship between the product offered by a startup and the quality of human life. It is important how and on what levels startups function in today's reality and how their activities can affect the quality of human life. The implementation of the chosen goals was possible thanks to the studies of the literature on the subject and the conduct of a questionnaire survey. The work also presents a case study of a Polish startup, the product of which is an innovative solution that can be used when ordering meals online for employees. The offered product affects the quality of users' work, making it easier for them to order and plan a meal at work. In addition to saving the time needed to prepare a meal or go to a restaurant to eat it, it should be reflected in their well-being or work efficiency. The survey provided information on how online ordering of meals is perceived by the users of the application.

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Produkty oferowane przez startup a jakość ludzkiego życia

Abstrakt: Rozwój nowoczesnych gospodarek determinowany jest wieloma czynnikami. Jednym z najważniejszych jest wykorzystanie nowych technologii i innowacji, które jednocześnie umożliwiają wprowadzanie rozwiązań z zakresu przemysłu 4.0. Formą organizacji zorientowaną na innowacyjne rozwiązania jest startup. Celem artykułu jest ukazanie zależności pomiędzy produktem oferowanym przez startup a jakością życia człowieka. Ważne jest, jak i na jakich poziomach startupy funkcjonują w dzisiejszej rzeczywistości i jak ich działalność może wpływać na jakość ludzkiego życia. Realizacja wybranych celów była możliwa dzięki przestudiowaniu literatury przedmiotu oraz przeprowadzeniu badania ankietowego. W pracy przedstawiono również *case study* polskiego startupu – jego produktem jest innowacyjne rozwiązanie, które można wykorzystać podczas zamawiania posiłków online dla pracowników. Oferowany produkt wpływa na jakość pracy użytkowników, ułatwiając im zamówienie i zaplanowanie posiłku w pracy. Oprócz oszczędności czasu potrzebnego na przygotowanie posiłku lub wyjście do restauracji, aby coś zjeść, przekłada się to na ich samopoczucie czy efektywność pracy. Badanie dostarczyło informacji o tym, jak zamawianie posiłków online jest postrzegane przez użytkowników aplikacji.

Słowa kluczowe: startup, jakość życia, innowacyjny produkt

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